

ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING
ONTARIO MINISTRY OF ENERGY
CITY OF OTTAWA

SOLAR ACCESS
PROTECTION FOR
BUILT-UP AREAS

FINAL REPORT

ACKNOWLEDGMENTS

An early step in the long procedure to establish the feasibility of solar access protection in built-up areas and to develop a process by which it may be enacted by a municipality, was to set up local Advisory Committees on Solar Access. The Westboro Committee, among them, developed a method of working as a team of local experts, which is believed to open new in-roads in participatory planning. A debt of gratitude is acknowledged to all members of this Committee, as follows:-

Professor Peter Fitzgerald

Mr. David MacKay

Ms. Agnes MacIntosh

Mr. Chuck Jackson

Mr. Don Smiley

Mr. Fred Lambert

Ms. Betty MacKay

Special thanks are due to Mr. Glenn Tunnock, MCIP, who supervised this study on behalf of the Ministries of Energy and of Municipal Affairs and Housing.

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SOLAR ACCESS PROTECTION IN BUILT-UP AREAS

The objective of this study was to establish the feasibility and develop a process by which access to solar energy may be legally protected for every property in built-up areas of a city. The method involved an investigation of the protection provided by current municipal zoning, a derivation of principles for further protection through the involvement of citizens and a trial application of these principles in order to evaluate the possible social, economic and environmental impacts of a Solar Access By-law.

A brief review of relevant literature indicated considerable scope for original research on the subject, in the areas of public involvement in the formulation of solar access protection principles and in the evaluation of the social, economic and environmental impacts of a Solar Access Protection measure.

A preliminary technical study established that current zoning left much to be desired in terms of solar access protection beyond roof surfaces. In order to encourage passive or active collection of solar energy, it was considered essential to protect solar access on south-facing walls and on parts of a lot. Experiments with the heliodon - an instrument that simulates the movement of the sun on various latitudes, seasons and times of the day - led to the realization that in already built-up areas, no measure could ensure solar access to all useful surfaces, on all properties. Given the density of an area, only experimentation with different solar envelope shapes could yield an optimum percentage of homes to be thoroughly protected. A 'solar envelope' defines the volume of developable space on a lot which will cause no obstruction on a protected surface of a neighbouring property.

In view of the multitude of factors requiring value judgements - on existing trees, streetscape and traditional architecture, for example - it was decided to formulate Solar Access Protection principles with public involvement. Public debate was initiated by the distribution of the preliminary technical study and the organization of public meetings in three areas of the City - Westboro, Glebe and Ottawa South - selected on the basis of local interest in solar energy utilization, relevant environmental features and loyalty of residents. Local advisory committees were formed and early working sessions indicated two legal approaches to solar access protection:

- (a) through the establishment of a new property right to such protection; and
- (b) through reliance on existing municipal zoning powers to regulate the intensity and shape of development on subdivided lots.

The former was considered to lie beyond the remit of this study, while the latter was developed as a set of principles (shown in Section 5 of this report) by the Westboro Committee.

Following discussion of these principles with a group of experts assembled by the Solar Energy Society of Canada Inc. and the City of Ottawa, the Westboro Committee presented them to their community, through an information campaign and two public opinion surveys. These produced a majority of 85.9% in favour of solar access protection and acceptance of 9 out of 12 principles. A final public meeting resolved the outstanding three principles as well.

The principles define a solar access envelope suitable for the residential densities and heights in Westboro, as a device to control building shape and volume. Provisions to control the extent and duration of shade produced by signs, accessory buildings, fences and vegetation are also included, although their application will require enabling legislation from the Provincial Legislature.

Circulation and comment on these principles from 17 technical agencies and numerous organizations and experts resulted in some refinements and modifications. Planning Branch subsequently tested the performance of these principles by trial application over the City from April to July, 1983. The extension of the area of application - from Westboro to the entire City - brought a wider range of development proposals within the scope of the experiment and led to more reliable conclusions. The most important of these conclusions were that the majority of applications for renovation or new development already conformed* by incorporating solar design features and allowing solar access to neighbouring properties often by pure chance. The distribution of a SOLAR DESIGN GUIDE and the offer of design advice across the counter helped to increase the number of conforming applicants significantly.

The assessment of the impacts of a solar access protection measure for a city of the size of Ottawa concluded that administratively, the cost of employing a full-time energy planner, part-time building inspector and an hour-a-day secretarial assistance was a small price for a permanent benefit, in terms of greater energy efficiency and an open, airy environment, particularly as computerization held out the promise of further cost reduction. Economically, a mandatory by-law could require a reduction of up to 11% of the building volume of a proposal, but in the case of large sites, an additional 26% to 32% more dwelling units could have been accommodated, though at 7% to 12% higher cost for foundations. This meant a wider profit margin for conforming developers, although individual cases may vary considerably. Solar energy gains were estimated to save between 8% and 21% of all energy bills, throughout the life of the examined buildings. Impact on zoning and the value of sites would be nil in the case of areas zoned for 3-storey or lower development - i.e., the vast majority of Canadian urban areas - while in the case of more intensive development zones, the adverse effect would increase with height. Land owners could however, be compensated through the allowance of mixed land uses appropriate to a community, to promote energy efficiency through greater scope for multi-purpose trips and greater self-containment in general. Socially, the impact of a solar access by-law appeared to be only beneficial, encouraging residents to be more aware and assertive in respect of their right to enjoy sunshine and use solar energy. Finally, the

* STATISTICAL NOTE: Out of a total of 2,346 cases examined (95.8% of them in the residential sector) nearly 60% conformed, 33% required slight change and only 7% required major change in design.

environmental impact of such a by-law could be seen only over the long-term of at least a generation of trees, when non-conforming vegetation could be replaced with 'habitat landscaping'. This will keep low-growth, deciduous vegetation on the south side of homes and allow evergreens on the north side. An important conclusion of the experimental application of solar access principles concerned the education of land surveyors, urban planners and other 'subdividers' of the raw land for development. Their education should lay emphasis on east-west orientation of streets is the most important factor in solar energy utilization and solar access for all homes.

As the experimental application of solar access principles proved the feasibility of a voluntary measure in all but the downtown areas of Ottawa - where existing high development already precluded the enjoyment of sunshine in all but specially protected areas like parts of Spark Street - the City adopted the SOLAR DESIGN GUIDELINES included in Section 6 of this report.

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TERMS OF REFERENCE

The goals and objectives of this project, in accordance with the City's application for an Energy Conservation Through Land-Use Planning grant to the Ontario Ministries of Energy and of Municipal Affairs and Housing may be stated as follows:-

GOAL:

Establish the feasibility and develop a process by which Solar Access Protection may be enacted for built-up areas in the City.

OBJECTIVES:

- i. To establish the feasibility of Solar Access Protection in existing built-up areas;
- ii. To develop a process by which Solar Access Protection may be enacted for selected areas in the City.

The present Interim Report deals with parts of both these objectives.

DATE OF COMPLETION OF THE PROJECT:

January 31, 1984.

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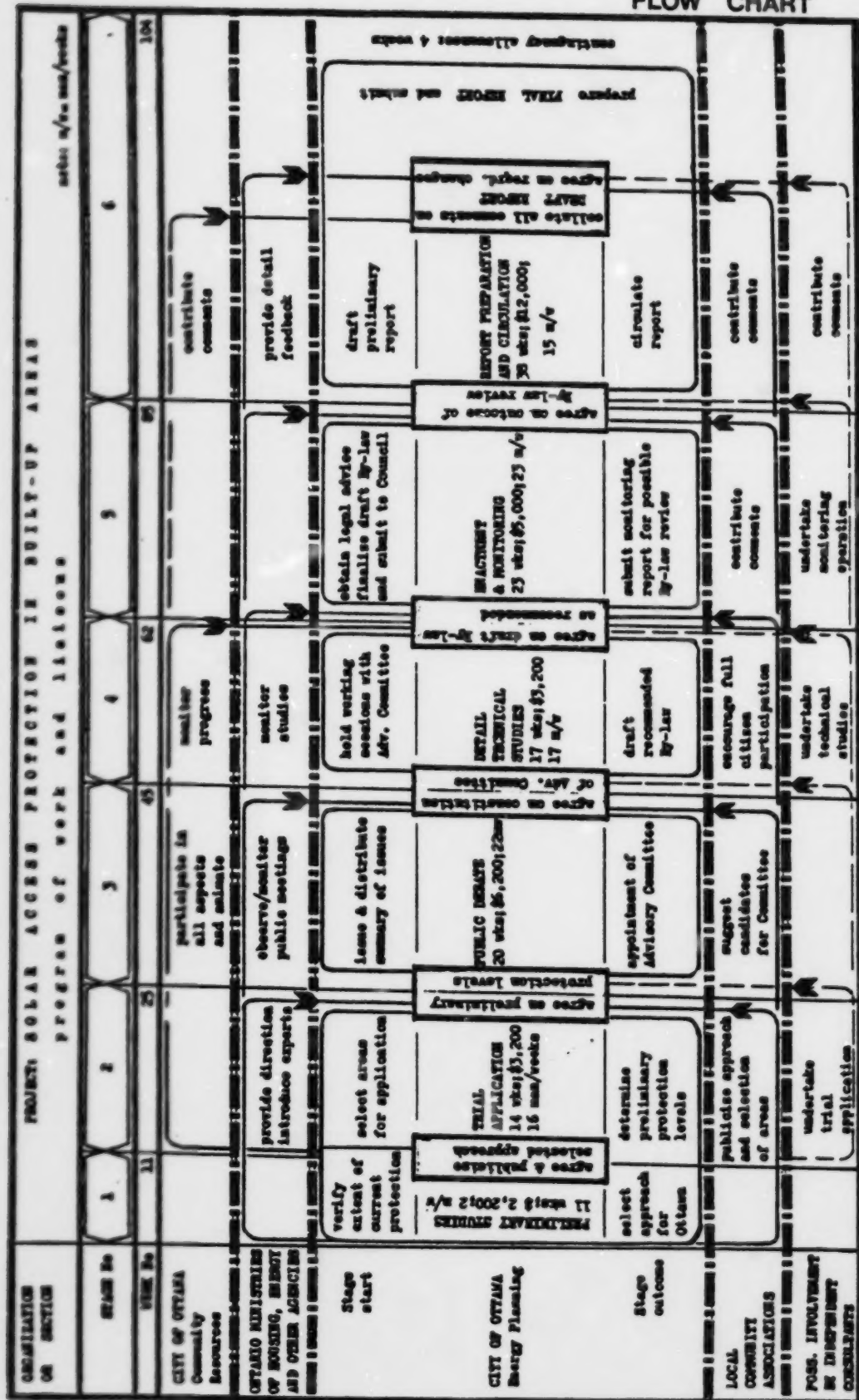
METHODOLOGY

The two objectives of this project - establishing the feasibility of Solar Access Protection and developing a process of enacting such protection - have been pursued through a unified methodology involving the following steps:-

1. Preliminary technical studies on various aspects and implications of Solar Access Protection to establish:
 - i. the level of protection provided by current zoning in various areas of the City;
 - ii. the level of any additional protection required over and above level (i) to ensure an adequate heat gain through solar radiation, for domestic space and water heating purposes;
 - iii. the approach necessary to derive principles for Solar Access Protection through the involvement of citizens.
2. Selection of built-up areas in the City for trial application of the approach 1(iii) above through:-
 - i. the inclusion of communities interested in Solar Access Protection;
 - ii. the selection of communities with east-west oriented streets, as well as north-south oriented ones;
 - iii. the inclusion of communities which have a fair representation of various socio-economic conditions, housing densities, heritage buildings, trees and a mixture of land uses in the City.
3. Issue of a discussion paper describing the preliminary technical studies, focusing on problems and opportunities in the selected trial areas and summarizing the cases for and against the legal protection of solar access.

4. Public debate on Solar Access Protection, starting with the issue of a pamphlet giving an executive summary of the discussion paper and the initiation of public meetings at the community centres of the trial areas. These meetings should be concluded with the election of Local Advisory Committees on Solar Access Protection, to hold working sessions with the City Energy Planner, in order to produce a series of recommendations to City Council. These recommendations may serve as the basis for a Model Solar Access By-law.
5. Application of the Model on a voluntary basis in order to monitor its performance and evaluate the social, economic and environmental impacts of Solar Access Protection.
6. Final report and recommendation on the advisability or otherwise of legally protecting solar access and the steps to be followed to ensure community involvement in the process.

This report provides details of the work carried out to meet these six objectives. Work started on February 15, 1982 and proceeded in accordance with the programme on the Flow Chart (See page 7), to be completed on January 31, 1984.



S E C T I O N 1BRIEF SURVEY OF LITERATURE ON SOLAR ACCESS PROTECTION

There is a growing body of literature on Solar Access Protection and it is proposed to focus strictly on the objectives of the project in order to limit the search into related publications. The purpose of this section of the report is to establish the extent of coverage by existing literature of the knowledge and methodology required to investigate each of the objectives of the project. Thereafter, the gap in this knowledge may be defined and the focus of research clearly indicated, in order to meet the objectives.

AREAS OF INTEREST IN RELATION TO PROJECT OBJECTIVES

An analysis of the two objectives of the project indicates that the following areas of interest are implied:-

OBJECTIVE (i) FEASIBILITY OF SOLAR ACCESS PROTECTION IN BUILT-UP AREAS

1. Methods of protecting Solar Access through land-use zoning; (Note: Legal methods other than zoning have also been studied by the City of Ottawa, but they do not form part of this project.)
2. Feasibility of Solar Access Protection through area-specific zoning By-laws;
3. Protection of existing trees and heritage buildings as part of a Solar Access Protection By-law;
4. Feasibility of various levels of Solar Access Protection in a built-up area.

OBJECTIVE (ii) PROCESS OF ENACTMENT

5. Public participation provisions in the Planning Act and additional requirements if any, for Solar Access Protection in built-up areas.

6. Alternatives in process and approach to the preparation of a model By-law on Solar Access Protection.
7. Methods of monitoring the effect of a new By-law, in terms of social, economic, environmental, administrative and other impacts.
8. Methods of negotiation and mediation between citizen groups, trade groups and other socio-economic and pressure groups.

These 8 areas of interest were communicated to the Intergovernmental Committee on Urban and Regional Research (ICURR) with a request for a search into references and information sources on them. They were investigated in parallel with the progress of this research to ensure adequate preparation for each stage of work. The results of this investigation are shown in the form of an annotated bibliography (inserted as an appendix), a summary of the most relevant publications and the conclusions, which form the remainder of this section.

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1. METHODS OF PROTECTING SOLAR ACCESS THROUGH LAND-USE ZONING

(a) SOLAR ACCESS AND URBAN FORM

by Ralph Knowles

AIA Journal/February 1980/pp. 42-44 and p. 70

Describes a method of tracing the 'Solar envelope' (ultimate development envelope) for any given site and investigates the 'time dimension' to urban form brought to bear by the consideration of a universal right to Solar Access.

This 'time dimension' is a sense of orientation and latitude on the Earth, imparted to a building through the consideration of Solar Access to neighbouring sites. Some existing street patterns - e.g. the Spanish grid of streets in downtown Los Angeles, which is oriented nearly 45° off the cardinal points - provide advantages for the use of solar heat and light, while others - e.g. the Jeffersonian grid which is oriented to the cardinal points - leave something to be desired. Other impacts of the solar envelope include:

- (i) the scale of developable volume (highest for the Jeffersonian);
- (ii) the shape of this volume;
- (iii) district character due to adaptation to local topography and flora;
- (iv) departure from symmetry on east-west streets;
- (v) symmetry on north-south streets;
- (vi) height of buildings (lowest on the south side of an isolated block;
- (vii) emphasis on intersections (higher buildings on the north corners of an east-west grid); etc.

This diversity within the framework of solar access protection offers the potential of a legible urban environment with natural cues to latitude, district, pathway, direction and genius loci in general: an ecological basis to our cities.

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2. FEASIBILITY OF SOLAR ACCESS PROTECTION THROUGH AREA-SPECIFIC ZONING BY-LAW

'Solar zoning' has found extensive application in USA, but in Canada, only the City of Brampton has passed a by-law applicable to open land earmarked for residential development ("Sunrise Meadows").

The feasibility of solar access protection through zoning of infill sites is being tested through the application of the solar access principles in Section 5 of this report for the rezoning of two large sites in Westboro, and older suburb in the west end of Ottawa. These sites, owned respectively by SUNLIFE ASSURANCE CO. OF CANADA and URBANDALE REALTY CO. LTD., were to be rezoned in conformity with the provisions of the Westboro Development Plan (Approved: February, 1980), which stipulated the "avoidance of overshadowing" on neighbouring residential zones. Preliminary designs for both these sites indicated multi-storey tower structures in the middle of the available area, to minimize overshadowing of neighbouring properties.

Following a discussion on the feasibility of solar access protection through area-specific zoning between the energy planner and the planner assigned to prepare zoning by-laws to implement the Development Plan, the former drafted solar envelopes for the sites and the latter translated these into ziggurat forms. These could be stipulated in zoning terms which were legally enforceable by Council, by virtue of the powers conferred to a municipality by the (amended) Planning Act, 1980.

The proposed solar envelope or ziggurat forms accommodate an additional 26% to 34% more dwelling units than indicated by the preliminary designs of multi-storey tower structures and the new zoning designation will reflect this. The following bonus will also be available in order to encourage energy-efficient development on these sites:-

1. A greater variety of residential land uses than permitted under the present restrictive zoning;
2. Greater variety of apartment sizes to allow more varied household sizes to live together;
3. The possibility that the combination of residential housing forms, the Floor Space Index and the building heights and locations created by the solar access protection envelope would yield a greater number of units and more development flexibility than is permitted by the present zoning.

Following acceptance of these points and of the entire rezoning proposition by the owners of these two sites and area residents, a By-law amendment will be submitted to Ottawa Planning Board. If this meets with Ottawa Planning Board and Council approval, the By-law amendment will be presented to the Ontario Municipal Board for approval as part of normal procedure.

3. PROTECTION OF EXISTING TREES, HERITAGE BUILDINGS OR PARTS OF BUILDINGS AS PART OF A SOLAR ACCESS PROTECTION BY-LAW

- (a) The State of Oregon Model of Solar Access Recordation Ordinance for Municipalities received from the Department of Energy of the State of Oregon., Salem, Ore 97310

Allows any home or business to apply to City authorities to have their solar access recorded and guaranteed with a sunchart documenting the sunlight available to their collector(s). The ordinance prescribes standards that a system must meet, including a minimum of energy contribution.

If the standards are met, restrictions are placed on new construction and vegetation except if they are part of the City's Official Plan, in which case they are traced on the sunchart. Buildings, heritage structures and trees that shade a collector at the time of application are exempt from controls.

Comments: This model favours the more prosperous, educated and energy-conscious groups, as they are likely to be the first to have their retrofitted collectors recorded and solar access guaranteed. It could also encourage the tendency to build up something high as quickly as possible, before any neighbour has had his solar access recorded. Official Plan Amendments are also rendered more time-consuming and would generate more attrition than at present. The model could however be used for the protection of solar access to heritage buildings.

4. FEASIBILITY OF VARIOUS LEVELS OF SOLAR ACCESS PROTECTION IN A BUILT-UP AREA

- (a) Protecting Solar Access For Residential Development A Guidebook For Planning Officials, Published by HUD & US Department of Energy, Washington DC 20402.

Discussion of the arguments in favour of protecting Solar Access; Zoning to do so; Subdividing land; regulating trees and landscaping; and Site Plan Review in relation to Solar Access.

Good exposition of the levels of Solar Access feasible in a residential area; alternative solar envelopes; calculation of shadow patterns. Methods of defining Ultimate Development envelope (Bulk plane, Shaved envelope and Ziggurat); Optimal building orientations; Selection of tree species favourable to solar access; etc. Ends with Appendix on model Solar Access ordinances.

5. PUBLIC PARTICIPATION PROVISIONS IN THE ONTARIO PLANNING ACT AND
ADDITIONAL REQUIREMENTS FOR SOLAR ACCESS PROTECTION IN BUILT-UP AREAS

Section 17 (2) of the revised Planning Act, 1980 (Bill 159 of 1981) stipulates that a council, before adopting a plan, shall give 30 days notice to hold a meeting for the purpose.

Section 17 (3) specifies that this meeting shall be open to the public and every person attending shall be afforded an opportunity to be heard in respect of the adoption of the proposed plan.

Section 17 (4) allows any agency to submit comments to the council on the adoption of the proposed plan, within 30 days, unless the council agrees to an extension.

Section 17 (5) stipulates that only after the above meeting may a council adopt the plan by By-law.

Section 17 (7) requires the Clerk of a Council to notify all persons and agencies who have filed a written request to be notified of the adoption of the plan, within 10 days of such adoption.

As regards Land Use Controls and Related Administration, Section 34 (11) requires a municipality to give at least 30 days notice that an open meeting will be held to consider a by-law on such controls. In view of the fact that solar access protection through land use zoning would be based on such controls, this Section is particularly relevant.

Section 34 (12) stipulates that the meeting must be open to the public and provide an opportunity to be heard.

Section 34 (13) gives agencies 30 days to submit comments, unless a council grants an extension.

Section 34 (16) stipulates 30 days appeal period.

All these provisions allow participation by way of objection to a plan or by-law already prepared. The formulation of a solar access protection by-law, however, is considered to be a measure which could affect people's homes in terms of perspectives for further growth, the reception of sunlight, the size and species of trees in the streets and in private yards and the neighbourhood environment in general. As many value judgements are involved in the formulation of solar access provisions, it would be prudent to involve people in this formulation in order to ensure that it will be acceptable to them.

Provisions for public participation at the inception stage of a by-law may not exist in the Planning Act, but this project will provide opportunities for experimenting with such participation.

6. ALTERNATIVES IN PROCESS AND APPROACH TO THE PREPARATION OF A DRAFT BY-LAW ON SOLAR ACCESS PROTECTION

No specific reference was found on this topic, but summarizing various readings on participation, administrative procedures and publicity material issued through the CONSERVATION PIPELINE in 'The Citizen' on solar access protection, the following three approaches, as considered in the course of this research, may be put forward.

- a. The technical approach to By-law formulation would involve research on all aspects of solar access protection and consultation with legal, finance and other departments within a municipality, before formulation. The version resulting from this process would be presented to Planning Branch and Council and if acceptable to the elected representatives of the community, it would be approved. Thereafter, Ontario Municipal Board approval would place the By-law in force for implementation
- b. The public participation approach would involve the preparation of a draft by-law within the community development department of a municipality. In accordance with the Ontario Planning Act, 1980, this draft would be publicized and distributed in the community in order to hold public meetings to discuss its provisions. Objections would result in public hearings and pending the outcome of appeals, the Ontario Municipal Board would confirm or reject the proposed By-law.
- c. The networking approach: would involve people in the formulation of principles in order to resolve questions requiring value judgements - streetscape, trees, heritage buildings, etc., all of which are likely to be affected by solar access protection. This approach will be pursued in the course of this study and details will be given in Section 3.

(a) BY-LAW 139-79 (AMENDED BY 180-79) OF THE CITY OF BRAMPTON

A 50-acre subdivision submitted by the Alliance Building Corporation provided the opportunity to set up criteria and policies for solar access protection and orientation as follows:

- usable sunlight is received from 9:00 a.m. to 3:00 p.m.
- critical south-wall orientation for Brampton: Between 10 and 20 alignment south of west. (Specific to Alliance site).
- maximum height of potential obstructions: Defined by a flat plane at an angle of 71.5° to the vertical plane (or 18.5° to be horizontal rising from the 9.14m (30') rear yard setback line.

The By-law consists of the following elements:

- amendments of the original By-law
- schedule of lands subject to the By-law
- type of dwellings permitted
- restrictions in terms of
 - (a) front yard setback
 - (b) minimum rear yard and side yards
 - (c) south-wall orientation
 - (d) maximum height of obstructions to sunlight (71.5° plane)
 - (e) fences and vegetation
- next type of dwelling, restrictions, etc.
- definition of terms
- explanation of solar aspects:
 - south wall alignment
 - maximum heights of obstructions
 - shadow calculations for December 21st

Comment:

The approach is suitable for vacant lands zoned residential, but the format could be applicable to more general by-laws, covering vacant as well as built-up areas.

(b) PERSPECTIVES ON ACCESS TO SUNLIGHT (ONTARIO MINISTRY OF ENERGY, 1980)

An evaluation of legal options for solar access protection concluding in favour of solar zoning. North American cities which have adopted zoning include: Davis and Century Cit, (California). Colorado Springs, Pitkin County and Indio (Colorado), Albuquerque and Los Alamos (New Mexico), Largo (Florida). The states of Oregon, Arizona, Michigan and Illinois provide model By-laws to their municipalities. Following a discussion of Planning Act provisions favourable to solar access protection, this publication advises municipalities to enact a By-law on Shade Control to enable some regulation of trees because "zoning by-laws" cannot, at present, control vegetation. Thus, a shade control law would be a useful supplement to a solar access protection law. After granting exceptions to valuable existing trees in an area, the by-law would prohibit vegetation from shading collectors in a solar zone. Offending vegetation would be trimmed or cut down by a designated municipal official as a public nuisance. Prescribed accessory

structures impeding the use of an installed collector would also be subject to prohibition, without any compensation being paid to afflicted landowners.

- Massachusetts and Rhode Island provide the 'certification of solar site' model. All affected landowners are notified, given the opportunity to be heard and terms are agreed upon, including compensation in cases of hardship. Upon registration, the owner would become entitled to solar access protection for, say, 30 years. A named neighbour could still be given the right to build a specified garage. Interference would cause both public and private nuisance permitting enforcement by the site owner or by the municipality.
- Chicago has provided the model of 'transferable development rights', in the case of prohibitive compensation costs. This entails the designation of a transfer district (downtown), the conveyance of a parcel through purchase and resale by the municipality and reduction in property taxes to reflect lowered market value.
- the municipality could purchase solar rights by enabling legislation, in order to use them to improve the distribution of such rights in a local area.
- Japan considers sunlight as a fundamental human right and courts prevent or regulate overshadowing and award compensation. Municipalities may prohibit building over 10m height if it costs more than an acceptable number of hours of shade.

7. METHODS OF MONITORING THE IMPACT OF A NEW BY-LAW, IN TERMS OF SOCIAL, ECONOMIC, ENVIRONMENTAL AND OTHER UNFORESEEABLE TRENDS

Although the idea of an experimental by-law is not new, nevertheless a systematic method of monitoring and evaluating the impact of such by-laws does not appear to have been established. In the case of a solar access by-law there appear to exist two options in the evaluation of social, economic and environmental impacts:-

- a. Retrospective: All applications received in the past year for Building Permit, Zoning or re-zoning, Site Plan Control etc. can be reviewed by applying the principles of the experimental by-law retrospectively. Impact could be assessed in terms of modifications to proposed buildings in order to calculate the volume of building over the span of a year, that would have been curtailed or added on proposals in conformance with solar access principles. This total volume of building could be translated into construction jobs for the assessment of economic impact. The design effects could help in assessing the environmental impact, but only in the light of certain assumptions about the response of designers. The social impact, in terms of relationships between neighbours following the application of the by-law to the development proposal presented by one of them would be very difficult to assess.
- b. Prospective: Applied on forthcoming applications over the span of a year, or any carefully selected period during the year - to ensure a satisfactory sample and variation of applications - the operation of monitoring the impact of an experimental by-law would be more realistic. Designers would receive a SOLAR DESIGN GUIDE in order to assist the inception of buildings in the 'solar idiom', rather than apply it as an afterthought or 'correctional' measure. Economic, social and environmental impacts could all be assessed realistically, with no assumptions having to be made. Evidently, there are considerable advantages to be gained from a prospective application of an experimental by-law on solar access and this approach will be followed in this project.

8. METHODS OF NEGOTIATION AND MEDIATION BETWEEN GROUPS

The groups borne in mind when seeking references on this subject were developers and residents. Although J. Lorimer's books *THE DEVELOPERS* and *THE CITIZEN'S GUIDE TO CITY POLITICS* represent a polemic on the methods used by developers in pursuing their objectives, there is little guidance on how to negotiate with them rather than outrightly oppose them.

One alternative considered early in this project was to include a HUDAC representative in the local Advisory Committees on Solar Access. In view of the intensive programme of studies required to establish solar access principles however, both Committees dismissed the idea in favour of formulating principles first and subsequently circulating them for comment as in the case of other technical agencies and professional associations - see Section 4.

In Edmund Burke's *PARTICIPATORY APPROACH TO URBAN PLANNING* (1979) a case is made in favour of involving all "major implementors" in the formulation of decisions and solutions to urban problems. This implies that the problems and interests of the implementors or developers must also be addressed in these solutions (BRADSHAW, 1982), if they are expected to take risks and commit capital.

A recurring theme in Lorimer's books (e.g. *THE REAL WORLD OF CITY POLITICS*) is that citizens should be organized into groups in order to exert political pressure at City Hall, which often sides with developers. He argues in favour of establishing new structures to represent citizens in positions of control. All these measures would only increase confrontation and they cannot be taken as a practical guide to negotiation between developers and citizens, particularly on an unusual issue like solar access protection.

The method of negotiation to be pursued in this project is one of avoiding postures and establishing the merits and demerits of solar access protection through trial application and comprehensive impact evaluation. On completion of the trial application period, the Council will be presented with this evaluation and asked to decide whether solar access protection should be legislated for built-up areas in the City. Although it would be naïve to claim that politics will not be involved in this decision, yet the process of by-law formulation and impact evaluation - as parts of a Provincially funded research programme - will have been conducted in accordance with principles of equitable involvement by the consumers and suppliers of development in the City.

CONCLUSIONS TO THE SURVEY OF RELEVANT LITERATURE ON SOLAR ACCESS

The 'solar envelope' concept for the protection of solar access appears to hold the best promise for effective application in already built-up areas, because it preserves the right for late development - e.g., on infilling lots or by adding a second storey to a bungalow - for every property in the area.

Solar access may be protected through area-specific zoning, as currently being developed in the City of Ottawa. An important pre-requisite for a municipality is to have developed a set of principles for solar access protection and the success of their application depends a great deal on the incentives offered to developers for voluntary conformance.

Existing trees, buildings and heritage structures may be protected through designation as non-conforming. A problem is likely to arise, however, through the proliferation of non-conforming structures and trees in a relatively small area, because the flexibility and scope for compensatory provision through the protection of solar access on alternative surfaces is seriously undermined.

Roof top, south-wall, accessory-building and parts-of-a-lot are the levels of Solar Access Protection currently considered by North American municipalities. East and west wall strips offering the potential of solar access to north-east and north-west rooms of a house, do not appear to have been investigated.

The public participation provisions of the Ontario Planning Act allow for objections to planning proposals to be considered, but, in the case of solar access protection principles, the very formulation of such principles is thought to require the involvement of citizens, in order to reflect value judgements about local trees, heritage buildings, architectural traditions and streetscape.

Three alternatives appear to exist on the process and approach to the preparation of solar access principles: Technical formulation, participatory approach and "networking". The latter will be experimented with in this study.

Two methods of monitoring the impact of a new by-law may be considered: Retrospective and prospective. The former is based on a review of past cases and evaluates performance 'post facto', while the latter is applied to forthcoming cases. The latter appears to offer some definite advantages over the former in the case of a Solar Access By-law, because it provides scope for influencing design through the issue of guidelines and evaluating their impact on the learning process for designers.

Methods of negotiation and mediation between pressure groups range from political horse-trading between parties to outright battle for public opinion by the deployment of all media. The involvement of building industry representatives in the committee of local citizens for a joint drafting of solar access provisions will be suggested in the course of this study.

In conclusion, the gaps in research on the subject solar access protection in built-up areas are considerable and there is much scope for original investigation in this project.

S E C T I O N 2PRELIMINARY TECHNICAL STUDY

Steps 1, 2 and 3 of the METHODOLOGY were related to a preliminary investigation of the problems and opportunities offered by solar access protection to the City of Ottawa. This investigation was carried out early in 1981 and resulted in Discussion Paper CD-164-6, titled "PLANNING MEASURES to SAFEGUARD SOLAR ACCESS FOR PROPERTIES IN OTTAWA". It is included here as Appendix 1 of this report. The conclusions reached in this study had ramifications on 3 important aspects of the project and they will be summarized here for the sake of convenient reference, under the three headings that follow.

LEVELS OF SOLAR ACCESS

As a prerequisite to the development of a methodology for solar access protection it was essential to define two terms, as follows:-

"SOLAR COLLECTOR": A surface exposed to sunlight and forming a cover to an enclosure, in which by active - i.e. mechanical or chemical - or passive means - i.e. storage and convection - it collects and stores heat.

"SOLAR ACCESS PROTECTION": A legally enforceable right to a reasonable proportion of the natural, unobstructed flow of direct solar radiation, to a location where a solar collector could be installed".

In the light of these definitions and in accordance with the location of a collector, the study distinguished the following 4 levels of solar access protection: -

- i. ROOFTOP: Any part of a roof. This is the least controversial location for a collector because in an area zoned to have a certain ceiling of developable building height, the possibility of conflict between adjacent property owners is minimal.
- ii. SOUTH WALL: All or part of the surface area on the south-facing wall of a property. This may necessitate lower densities or specially designed roof shapes.
- iii. PARTS OF A LOT: Parts of the curtilage available to a building and well-exposed to the sun. This level of protection may require low densities, special roof shapes and large lots to be affective.
- iv. ACCESSORY BUILDING: Rooftop surfaces of garages and other outbuildings. Greenhouses may require south-wall as well as rooftop protection to operate effectively. This level may affect density, shape and lot size for buildings in the vicinity of a protected property.

A study of the potential for solar access protection in a built-up area would evidently involve the consideration of each of the above levels, as well as suitable combinations feasible for individual areas.

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PROTECTION AFFORDED BY CURRENT ZONING

A further prerequisite to the development of a methodology for solar access protection was to verify the current level of protection under the indirect effect of regulations passed by the City, for purposes other than solar access protection.

The City of Ottawa Zoning By-law AZ-64 defines a "building envelope" for every lot zoned for development in the City, by stipulating: front and side setbacks; a minimum open space area as a rear yard; and a ceiling of developable space, where no "FLOOR TO SPACE INDEX" (FSI) is indicated. These stipulations result in an imaginary envelope, within which all proposals for development, extension of a building or redevelopment on a site should be contained.

In order to verify the level of solar access protection afforded to a property under the effects of this by-law, a model was prepared showing: -

- a. Areas of various densities;
- b. Sites with potential for infilling;
- c. Streets running in two dominant directions by reference to the sunpaths over the City of Ottawa and the compass;
- d. Space available around buildings;
- e. Building envelopes as defined by stipulations for R2 and R3 residential areas in AZ-64, in which a 35 ft. or 10.7 m ceiling is in force.

In order to dwell on the effects of zoning alone, trees were purposely excluded from this model.

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The model was subsequently used to assess the amount of undesirable shading produced by the interrelationship of building envelopes as defined in By-law AZ-64. This assessment was carried out by placing the model on a heliodon (an instrument which simulates the movement of the sun in relation to a number of objects at a given latitude on the earth) and taking photographs of shading configurations at the following simulated times and seasons:

1. Winter solstice (Dec. 21)
 - 10 a.m.
 - noon
 - 2 p.m.
2. Summer solstice (June 21)
 - 10 a.m.
 - noon
 - 2 p.m.
3. Spring and Fall equinoxes (Sept. and March 21)
 - 10 a.m.
 - noon
 - 2 p.m.

The conclusions of the heliodon studies, on the assessment of the solar access protection afforded by By-law AZ-64 on R2 and R3 zoned properties of not more than 10.7 m or 35 ft height, may be summarized as follows:-

- i. Rooftop protection is afforded to all properties which are 2 storey or higher. In most cases, bungalows remain vulnerable to overshading, if located in the zones examined.

- ii. South-wall protection is afforded to homes placed on the north side of east-west running streets.
- iii. Serious overshadowing of south walls is produced on homes located on either side of a north-south running street.
- iv. All other surfaces with a potential for the location of collectors - parts of a lot, east and west facing facades, etc. are also liable to overshadowing by homes in the vicinity.

Aerial photographs of various parts of Ottawa, taken at various periods in the year, tended to confirm these findings. Another conclusion at the end of the heliodon studies was that in an already built-up city like Ottawa, no measure could ensure 100% protection of solar access to the entire height of south-facing walls.

THE ARGUMENTS FOR AND AGAINST LEGAL PROTECTION OF SOLAR ACCESS

The prime function of the Discussion Paper was to generate public debate on the issues raised by solar access protection and thus prepare the stage for all the work in connection with this project. The main arguments put forward in favour of protecting solar access may be summarized as follows:-

1. Solar Access Protection would accord with and further Ottawa's Energy Conservation Policy in relation to Official Plan preparation and the promotion of energy-efficient planning in general.

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2. At latitude $45^{\circ} 29'N.$, Ottawa receives an average of 1,995 hours of bright sunshine per annum. This is more than the average for Vancouver (1600 - 1800 hours) or Windsor (1900 hours) which happen to be in lower latitudes.
3. The case in favour of legislating solar access protection in the City rests on the following grounds:-
 - i. Considerable savings in space- and domestic hot-water-heating in relation to the use of oil for these purposes.
 - ii. Encouragement to property owners to invest in retrofitting for the exploitation of solar energy, with no fear of being overshadowed by a new structure or vegetation in the vicinity.
 - iii. Stimulus to architects and designers towards a creative, science-based style of architecture and building technology.
 - iv. Employment growth and diversification by virtue of encouragement to a new technology. Ottawa is well suited for solar technology by reason of the existing pool of labour and institutions related to research and high technology. Legal protection of solar access would stimulate new inventions for the exploitation of solar energy.
 - v. More variety in the urban scene by virtue of new shapes and materials.

- vi. Fairness in the distribution of opportunities to avail oneself of a ubiquitous source of energy.

4. On the other hand, the case against legislating solar access protection in the City is equally intriguing and rests on the following grounds:-

- i. "Blanket" protection (by means of land use zoning for example) may not be considered fair. Certain locations are more advantageous than others. This may kindle disparities among neighbours.
- ii. Politically, solar access protection may exacerbate existing inequities in land ownership (more land, more solar energy available) and be used as a new basis for property taxation.
- iii. Serious curtailment of the space available for extensions to buildings - particularly above the buildings.
- iv. Reduction of the potential for higher density in the very areas which energy conservation and existing infrastructure would indicate as being most desirable.
- v. Buildings of traditional style may not happily accept the shapes and materials dictated by solar technology.
- vi. Greater vulnerability of properties to vandalism - after they have been retrofitted with large areas of glass on the south side.

- vii. Trees and the urban scene in some well-planted streets would be seriously affected by solar access protection, unless it was applied with discretion.
- viii. Possible increase of litigation between neighbours.
- ix. Procastination in development control procedures and consequent delay in building. In times of economic crisis this may seriously affect some employment prospects.

The report concludes that the resolution as to whether solar access should be legally protected may be reached only through public debate and no preference is therefore indicated.

APPROACH TO BE FOLLOWED IN OTTAWA

The protection of solar access afforded by current zoning is evidently inadequate - it is certainly not sufficient to inspire confidence to householders to invest in solar technology.

The merits and demerits of protection are numerous, but the decisive factor is likely to be the degree of downzoning properties and automatically decreasing their value. If such a devaluation is not equitable across various scales of site area and the benefits are found to be relatively small, then no municipality is likely to accept solar access protection. After all, its very tax base is likely to be undermined by site devaluations. Early experiments on the other hand, indicate that an upzoning may be achieved through solar access protection.

One way of avoiding downzoning of a property is to shape the solar access envelope to approximate the shape of the majority of homes in a selected area. The shaping of envelopes may keep to the same storey-height, but pitch sides at an angle in order to allow deeper sunlight penetration. In zoning terms, this implies that the Floor to Site Index (F.S.I) remains the same, but the total volume of the envelope is slightly reduced. If winter climate and the abundance of snow for example, induce builders to adopt pitched roof shapes to help shed the snow, that same pitch might be exploited to increase sunlight penetration.

In order to derive principles for solar access protection in already built-up areas, it is proposed to adopt a method of participation which goes beyond the provisions of Bill 159 and the amended Planning Act. Rather than setting up a Solar Access Protection draft by-law and asking people to vouch for it, for example, it is proposed to set up working committees in selected areas in order to derive principles in solar access protection which reflect the values of the community. What is the value, for example, of existing trees - could local residents accept seeing them thinned or lopped to allow a ray of sunlight to penetrate at a particular time of the day? What is the value of traditional styles of architecture which have developed in the area over the ages and may now be threatened by this new "solar" architecture? Do people value the existing streetscape? All these questions require value judgements which Technical Officers at City Hall may not be able or willing to make and even if forced to make under the whip of official duty, they may feel that they are offending the community at large. Value judgements of this type, cannot and should not be made "over the head" of an educated and articulate public.

It is therefore proposed to devise a new participatory method which involves local residents - first as members of working committees and secondly, as interested citizens expressing opinions at public meetings and through statistically reliable opinion polls. The derivation of solar access protection principles by this process will help to overcome the ethical dilemma of the urban planning function - whether carried out by politicians or planners. Thereafter, the principles may be commented upon and their validity from the point of view of safety, health, financial feasibility etc. verified by technical experts. Modifications will be communicated to the local committees and, if agreed upon, the final draft would go forward for Council approval and implementation. The involvement of the community by this process will ensure proper implementation because people will feel that this is their by-law.

As the merits and demerits of solar access protection appear to be rather equally balanced and the method of deriving principles for such protection will be rather unusual - not to say novel - it would be advisable to experiment with a trial application of the principles of solar access for a period before final enactment and implementation. This trial application will allow a thorough evaluation of the likely social, economic, environmental and administrative impacts of solar access protection before Council enactment and lead to greater confidence in implementation of the by-law.

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S E C T I O N 3

FORMULATION OF A MODEL SOLAR ACCESS BY-LAW

The purpose of initiating the technical study described in Stage 2 was to generate public debate on the need for solar access protection and solicit public involvement in the formulation of a model by-law for such protection. The reasons for seeking public involvement may not be obvious, because the usual method of by-law formulation is to work out all details within a municipal department and subsequently seek Council approval. Solar access protection in already built-up residential areas however, involves decisions about existing buildings, extensions, infilling, trees, spaces between buildings and a host of related matters, dependent on the values that a local community has placed over the years, on the local environment. A purely technical formulation of a solar access by-law would be relatively simple, but due regard to local opinion was considered to be more important than a mere technical consideration of the issue.

This section will provide an account of the formulation of a model solar access by-law from the initiation of public debate on the issue, to the point where technical verifications were made on the provisions worked out by local committees.

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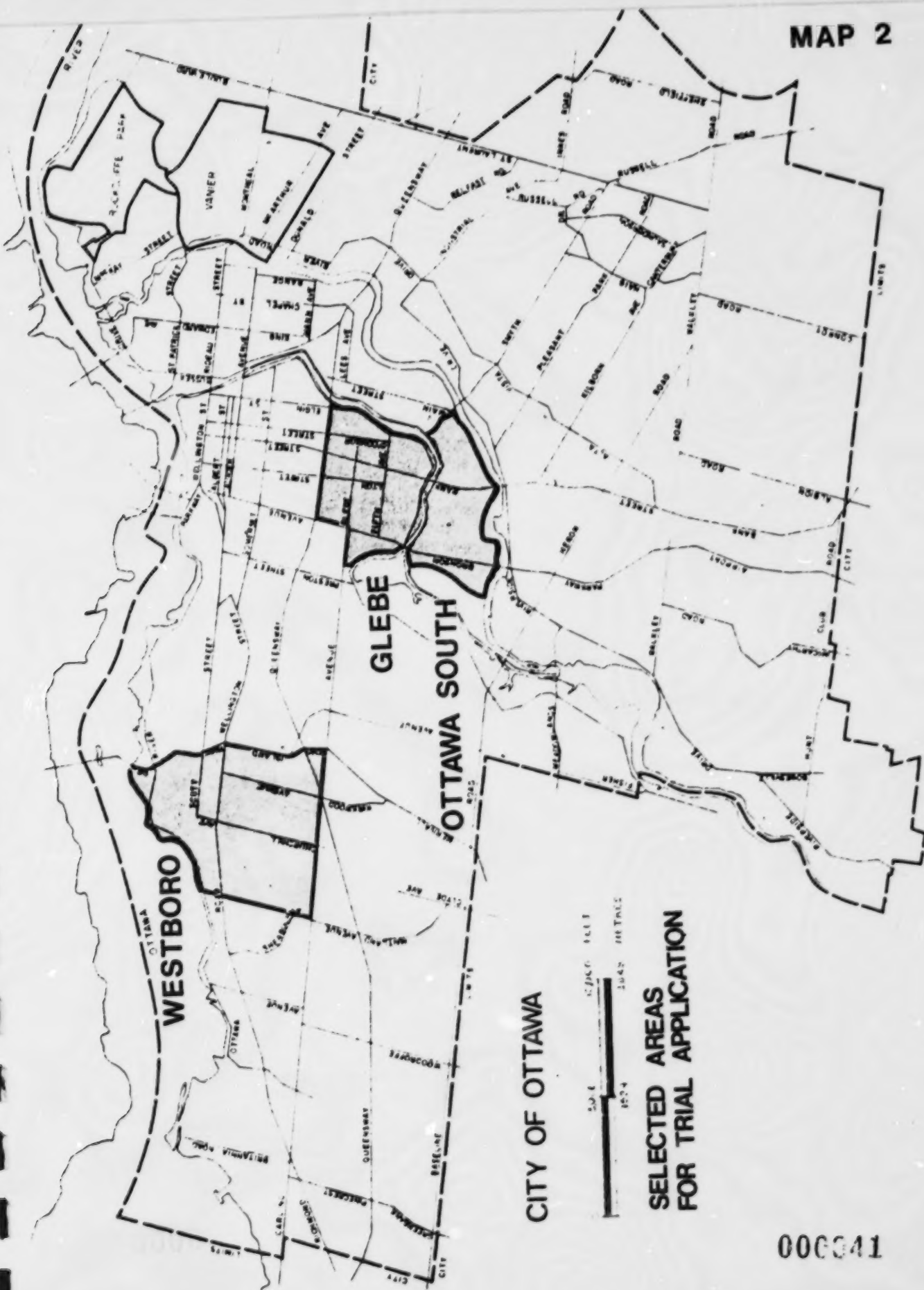
SELECTION OF TRIAL AREAS

One of the conclusions of the preliminary technical study (Appendix 1) was that solar access provisions may vary for each part of the City in accordance with the following factors:

- a. Depth of city blocks (from street to street)
- b. Presence of trees
- c. Dominant direction of streets
- d. Residential density in terms of the spacing and height of buildings
- e. The age and architectural style of buildings
- f. Local community feeling and interest in solar access protection

It is important to emphasize that the last factor could not be dealt with on a City-wide public participation basis. Ottawa, like many other long-established cities, has a local environmental character and distinct social mix in everyone of its 16 communities. It was considered essential to initiate action in a small number of distinct communities and formulate local provisions, out of respect for local character, before looking for similarities and deciding whether a City-wide by-law could be formulated.

In view of these considerations, it was decided to select the following three areas for the formulation of local provisions for solar access protection:



1. The Glebe
2. Ottawa South
3. Westboro

The particular attributes of these communities in relation to the task in hand, may be summarized as follows:

- a. Variety of city block depths and lengths - from the regularity of Glebe and Westboro to the irregularity of Ottawa South, lying between the Rideau Canal and Rideau River;
- b. Variation in the dominant direction of streets - from the approximately East-West orientation of the majority of streets in the Glebe and Ottawa South, to the approximately North-South one of Westboro;
- c. Variation of trees - in terms of density, height and species, varying widely in the selected areas;
- d. Variety of residential densities and building heights;
- e. Individual character of the selected areas, by virtue of the period architecture noticeable in each, the presence of heritage structures and

above all, the difference in their age - Glebe being the oldest and Westboro the most recent to be settled among the three areas. (See Appendix 2 for "A Heritage Guide to Westboro.")

- f. Topographical variety from the relatively flat areas of the Glebe to the small hillocks noticeable in Ottawa South and particularly Westboro.
- g. The loyalty of residents and the interest shown in planning matters. Ottawa South residents were the first in the City to suggest a study for the protection of solar access; the Glebe has been the favorite community for many social and planning studies; and Westboro is proud to continue to call itself "The Village" and demand the care and sensitivity appropriate to an environment which in many ways is still rather pastoral.

An appreciation of the local environment and awareness of local feeling should therefore be the paramount considerations in the selection of subsequent areas for a re-formulation or extension of the solar access provisions desired through the present study.

PUBLICATION AND DISSEMINATION OF THE TECHNICAL STUDY

Bearing in mind the purpose of the technical study as a starting point for discussions, once the trial application areas of the Glebe, Ottawa South and Westboro were selected, it was decided to include a preliminary survey of the problems and opportunities for solar access protection in these three areas, in order to make the entire study more relevant to these communities. As shown in

Appendix 1 (pp. 20-23) this survey indicated some shading effects at the most critical day of the year and singled out problem areas in solar access protection, in terms of the level of access feasible in each. The most extensive problem areas were found to lie in Westboro, due to the dominance of north-south streets. The study did not include any solution for these problem areas, emphasizing that further experimental work was considered essential to reach some recommendations "should the community itself opt in favour of solar access protection". The indeterminate outcome of the survey, restraint from indicating possible solutions and indication of a challenge to the community were all quite deliberate, in order to arouse interest and encourage the communities in question to take up the challenge.

A total of 500 copies of the entire study were published, together with 4,000 copies of the 2 page summary. An invitation to comment on the study was issued to some 120 community leaders, energy experts, municipal, provincial and federal officials, individuals and organizations. Several queries were received by telephone and publicity media also showed considerable interest. By the time the Ontario Ministries of Energy and of Municipal Affairs and Housing communicated their decision to sponsor the project as part of the ECTP research programme in January 1982, public opinion was considered to be well-prepared for the next step, as indicated below.

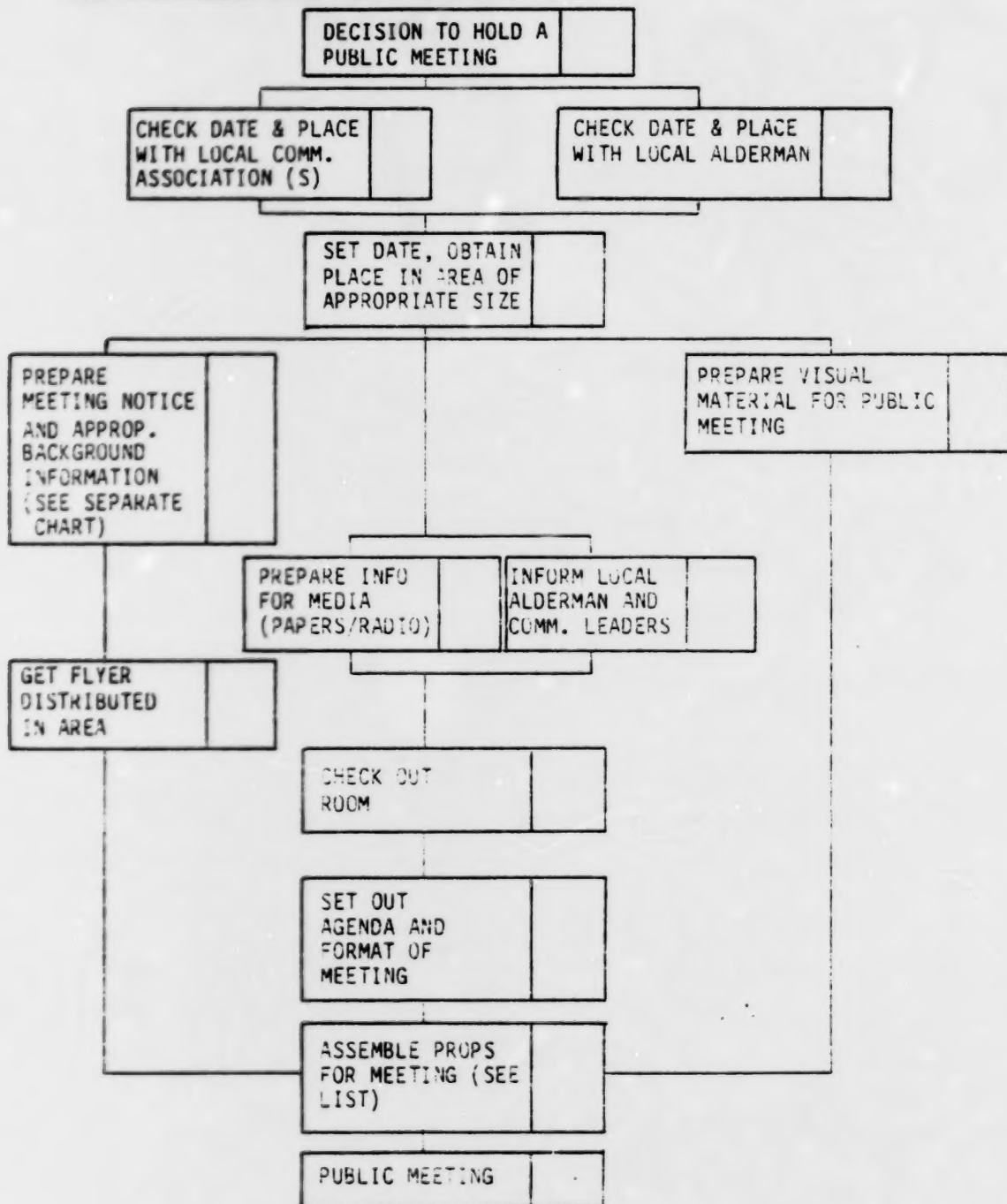
PUBLIC MEETINGS ON SOLAR ACCESS

The objectives of this step were as follows:

1. Initiate public debate on every aspect of solar access protection which appears to have captured the public's imagination;
2. Form local Advisory Committees on Solar Access Protection in the selected areas for trial application of the concept - i.e. Glebe, Ottawa South and Westboro;
3. Commence working sessions with the Committees to formulate guiding principles and provisions for a model solar access protection by-law.

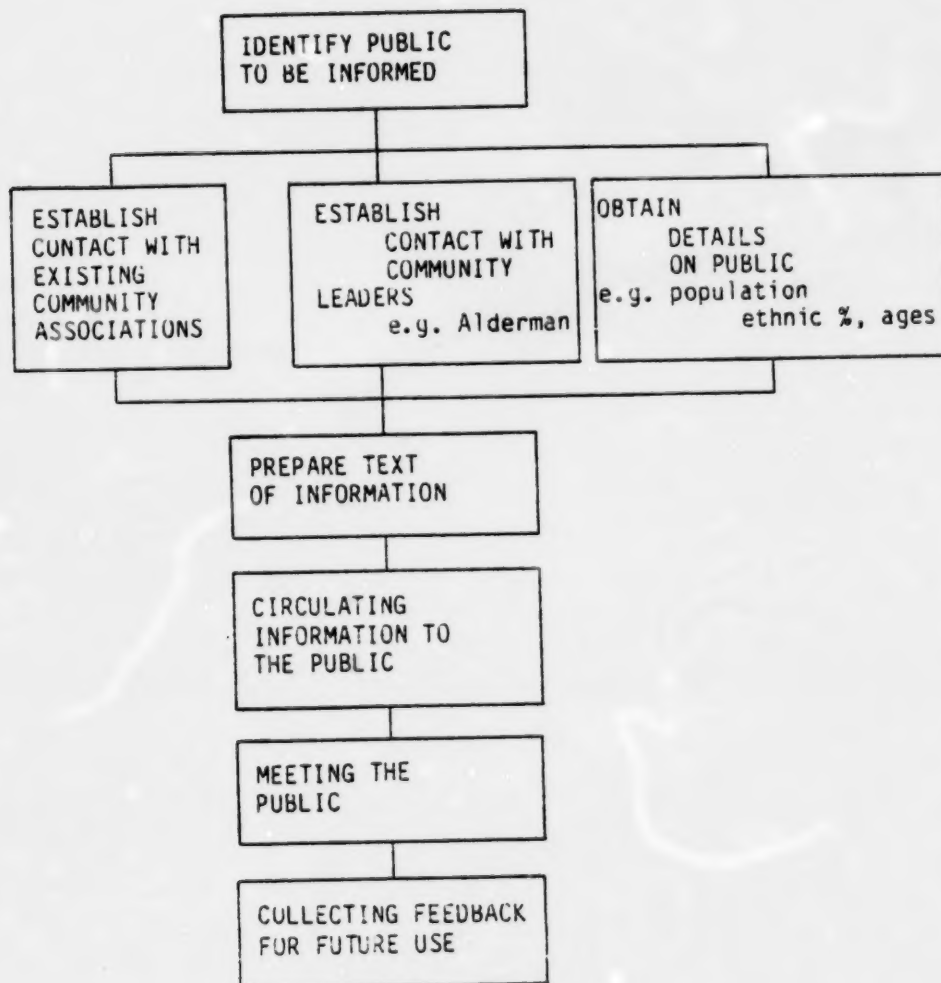
Action on the first objective included the setting up of public meetings in the selected areas in accordance with the algorithms shown on the next pages. The date for each meeting was fixed in consultation with the local Alderman and community leaders and bilingual poster announcements were prepared. Two or three days before each meeting, a copy of the poster and the executive summary of the technical study (Discussion Paper CD-164-6), together with a covering letter from the Director of Planning in French and English was distributed to every other house in the area. This distribution was affected in co-operation with the Ottawa Board of Education, the Energy Education Advisor of the Board contacting Heads of primary schools and schoolchildren carrying out the distribution on a city block per student basis. The information received by each household is shown on the following pages.

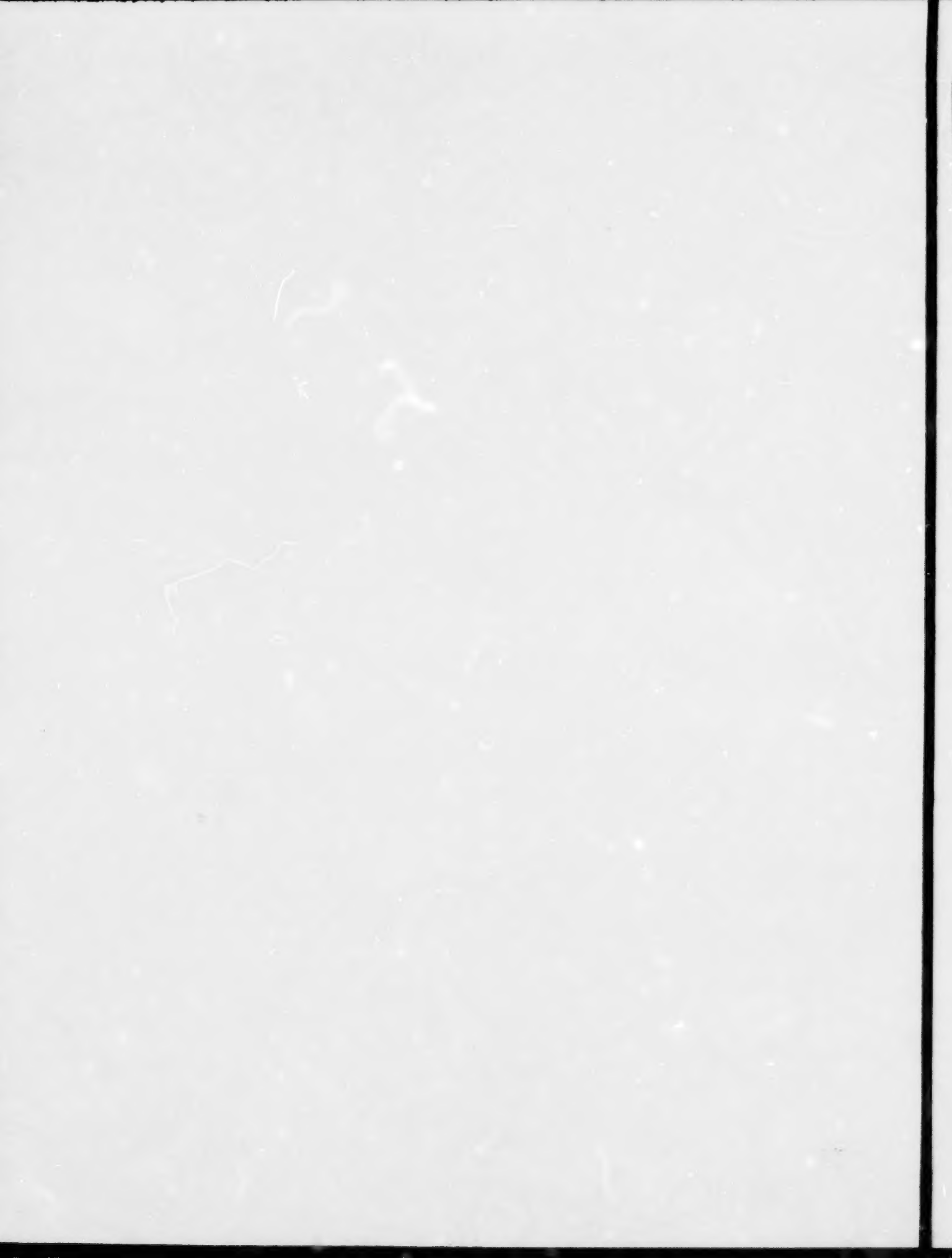
STEPS IN PREPARING FOR A PUBLIC MEETING



NOTE: Fill in dates and the names of the resource people who will be helping you in your preparations.

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COMMUNITY DEVELOPMENT
DEVELOPPEMENT COMMUNAUTAIRE

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COMMISSIONER-COMMISSAIRE

IN REPLY PLEASE QUOTE
EN RÉPONDIANT CITEZ CETTE LETTRE

MESURES D'URBANISME VISANT À ASSURER L'ACCÈS AU SOLEIL DES BÂTIMENTS À OTTAWA

Sommaire du document de travail CD-164-6

La politique municipale de conservation de l'énergie de la Ville, approuvée par le Conseil et constituant l'Arrêté municipal 162-81, établit les objectifs suivants:

1. Sensibiliser le public à la conservation de l'énergie, et encourager la coopération.
2. Modifier le Plan directeur et favoriser un bon rendement énergétique à l'égard des constructions.
3. Accroître l'efficacité des transports et diminuer la dépendance des sources d'énergie non renouvelables.
4. Accroître la conservation dans le secteur public et faire de la publicité à ce sujet, afin de donner l'exemple au secteur privé.

La protection de l'accès au soleil pour les bâtiments de façon à permettre à leurs propriétaires d'utiliser l'énergie solaire, est un aspect de l'objectif 2 et l'objectif de la présente étude est d'étudier les solutions possibles, d'établir un moyen simple de réglementer en ce domaine, et de voir quelques-unes des répercussions vraisemblables de l'accès au soleil. L'hypothèse est que le plus grand nombre possible de consommateurs d'énergie puissent avoir l'occasion d'utiliser l'énergie abondante du soleil, étant donné qu'avec près de 2 000 heures d'ensoleillement par an, Ottawa est plus fortunée sous cet aspect que Windsor et Vancouver.

L'argument en faveur de la protection de l'accès au soleil est d'abord et avant tout l'épargne considérable dont profiteraient les propriétaires en adaptant une maison située dans le Glebe, Ottawa-Sud ou Westboro, le secteur où l'étude s'est concentrée pour les applications de l'accès au soleil. Sur une période de cinq ans, les frais d'installation et d'exploitation d'un système de chauffage solaire représentent une économie de près de \$4 200 sur les coûts équivalents d'un chauffage au mazout. La protection de l'accès au soleil encouragerait le propriétaire à investir en ce genre d'adaptation, sans crainte que ses capteurs si coûteux ne soient continuellement sous la menace de se voir privés du soleil par une nouvelle construction ou de la végétation du voisinage. Selon l'emplacement des capteurs, il y a les quatre niveaux suivants de protection de l'accès au soleil:

- i) PROTECTION DE L'ACCÈS AU SOLEIL DU TOIT. C'est la façon la plus simple et la moins controversée, parce que dans un secteur résidentiel, disons de maisons de deux étages, la possibilité de conflit entre maisons voisines obscurcissant mutuellement les capteurs solaires des toits, est minime.
- ii) PROTECTION DE L'ACCÈS AU SOLEIL DES MURS AU SUD. Elle pourrait exiger des densités résidentielles plus faibles afin de protéger l'espace d'accès au soleil dont dispose une maison voisine.

- iii) LA PROTECTION DE L'ACCÈS AU SOLEIL POUR CERTAINES PARTIES D'UN LOT permet l'installation de capteurs solaires au niveau du sud. Il s'agit là évidemment d'une condition plus stricte étant donné que la sauvegarde de l'espace d'accès partout jusqu'au terrain entourant la maison d'un voisin, exige un lot étendu, un emplacement éloigné et peut-être même un toit ou une forme spéciale de construction pour une maison. Il est évident que toutes ces conditions se traduisent par plus de dépenses.
- iv) LA PROTECTION DE L'ACCÈS AU SOLEIL POUR LES CONSTRUCTIONS ACCESSOIRES, permet l'installation de capteurs solaires sur des garages ou autres annexes. Ceci peut paraître moins critique jusqu'au moment où on pense à installer une serre qui peut devenir plus tard une source importante de légumes frais, à la lumière de l'augmentation constante du prix des aliments.

Chacune de ces mesures peut convenir dans un secteur différent de la ville, selon les huit facteurs énumérés dans l'étude - (i) et (ii) ci-dessus, par exemple, semblent convenir presque partout dans le Glebe; (i), (ii) et (iii) dans la plus grande partie d'Ottawa-Sud, mais pour Westboro, le choix est moins clair. Un facteur important dans le choix du niveau de protection est vraisemblablement la réaction des citoyens. La cause en faveur de la protection est étayée par l'énumération des avantages indirects possibles de la protection de l'accès au soleil: croissance et diversification de l'emploi, encouragement aux architectes innovateurs, caractère diversifié du paysage urbain, etc. On pense que la méthode la plus simple d'établir légalement le "droit à la lumière", serait un ZONAGE ASSURANT L'ACCÈS AU SOLEIL visant les zones actuelles d'utilisation des sols dans la ville, imposant quelques conditions nouvelles portant sur la hauteur, la masse, l'emplacement des constructions, sur l'aménagement paysagiste, etc.

L'argument contre la protection de l'accès au soleil est fondé sur des facteurs sociaux, politiques, écologiques et légaux. Par exemple, un zonage général peut être considéré comme inéquitable, étant donné que certains emplacements sont plus avantagés que d'autres et il pourrait en résulter des conflits entre voisins. Sur le plan politique, la protection de l'accès au soleil peut accentuer et perpétuer les inégalités actuelles à l'égard de la propriété foncière et être utilisée comme un moyen d'imposer encore plus de taxes. Des restrictions imposées sur la construction par un zonage assurant l'accès au soleil auraient certainement des répercussions sur les perspectives de l'industrie de la construction et il peut en résulter un effet vraiment important sur l'environnement et la végétation: des formes et des surfaces sans harmonie, des capteurs solaires vandalisés, des arbres tronqués et des arbustes nains, etc. Comme moyen légal d'assurer l'accès au soleil, le zonage est simple, mais dans son application concrète, il pourrait bien donner lieu à des disputes et à des délais, ralentissant ainsi le processus de réglementation de l'aménagement.

La question de savoir si l'accès au soleil des bâtiments doit être protégé par une loi, pourrait peut-être trouver sa réponse par voie d'un débat public et c'est pourquoi aucune préférence n'est avancée dans l'étude. On propose de discuter du pour et du contre et des divers niveaux d'accès au soleil, au cours d'une série de réunions publiques, dans le Glebe, Ottawa-Sud, Westboro et ailleurs, afin de sensibiliser le public davantage et juger du sentiment de la collectivité à ce sujet. Les observations et des résumés des discussions tenues dans les communautés seront par la suite transmis au Conseil, en même temps que des recommandations concernant les mesures à prendre.



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IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

VOTRE MAISON A DROIT À SA PLACE AU SOLEIL EST-CE FAISABLE?

La nouvelle technologie nous fait connaître de nouvelles occasions, de nouveaux droits et de nouvelles obligations. Ces dernières années on en a eu un bon exemple dans les progrès de la technologie solaire. L'exploitation de cette source d'énergie, faible mais constante, ouvre de nouvelles perspectives à chaque foyer. Les capteurs solaires sont peut-être actuellement plutôt coûteux, mais de nouvelles inventions, la production en masse et la concurrence entre fabricants, pourraient bien permettre bientôt à chaque maison d'utiliser le soleil, d'une façon ou d'une autre, ne serait-ce que pour faire pousser des légumes dans une serre à l'arrière de la maison.

Il nous faut entre temps essayer de sauvegarder le droit de chaque maison de jouir de la lumière du soleil. Planter des arbres, construire des ajouts et de nouvelles structures pourraient compromettre fortement cette source d'énergie précieuse. Serait-il possible d'établir pour les constructions UN DROIT À L'ACCÈS AU SOLEIL? Quelles en seraient les conséquences pour l'environnement, les arbres en place et tout agrandissement auquel vous penseriez pour votre maison. Comment l'industrie du bâtiment et la croissance de notre ville en seraient-elles vraisemblablement affectées? Il y a là de grandes possibilités de controverse et le public doit être consulté.

Une étude réalisée par la Direction de l'urbanisme de la Ville d'Ottawa s'est penchée sur certains de ces problèmes et sur les sauvegardes possibles qui pourraient être introduites en vue de protéger l'accès au soleil. Mais en plus des problèmes techniques, l'impact de ces mesures et les impressions du public à ce sujet restent des impondérables.

C'est pourquoi vous êtes invité à une réunion publique (voir détails sur l'affiche ci-jointe) pour dire ce que vous pensez au sujet de la protection du droit à l'accès au soleil pour les maisons de votre secteur, et comment optimiser cette protection. On prendra note de vos observations et elles seront présentées au Conseil lorsque viendra le moment de prendre les décisions voulues.

VENEZ DONC DIRE CE QUE VOUS EN PENSEZ

Si vous aimez vous chauffer au soleil, vous serez certainement intéressé par la discussion des problèmes et des avantages de son utilisation pour plus de confort chez vous.

Le Directeur de l'urbanisme,

J. Thoms



42
OTTAWA

ROBERT BAILEY
COMMISSAIRE-CONSEILLER

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

SOLAR ACCESS PROTECTION FOR YOUR HOME

IS IT FEASIBLE?

Technology makes people aware of novel opportunities, new rights and obligations. A good example of this in recent years is the growth of solar technology. Exploiting the low but continuous energy of the sun, it opens new prospects for every home. Solar collectors may be rather expensive at present, but further innovation, mass production and competition between manufacturers may soon allow every household to make use of the sun in some way, if only for growing vegetables in a backyard greenhouse.

In the meantime we should attempt to safeguard the right of every household to enjoy sunlight. Growing trees, building extensions and new structures, could seriously obscure this valuable source of energy. Would it be feasible to establish a RIGHT TO SOLAR ACCESS for buildings? How would this affect the environment, existing trees, or any extensions you may be considering for your home? How is the building industry and the growth of our city likely to be affected? These are highly controversial matters on which public opinion must be sought.

A study by the Planning Branch of the City of Ottawa has been dealing with some of these questions and the possible safeguards that could be introduced to protect solar access. Beyond the technical problems however, there is an important question mark as to the impact of these measures and of public feeling on the matter.

You are therefore invited to attend a public meeting (see details in attached poster) and share your ideas on whether to protect and how best to protect solar access for homes in your area. Your comments will be noted and presented to the Council when seeking direction on future action.

PLEASE COME AND MAKE YOUR VIEWS KNOWN.

If you enjoy basking in the sun, you should certainly enjoy discussing the problems and benefits arising from its use for the greater comfort of your home.

J. Thoms,
Director of Planning.

GA:cmm-2
B28005

Attach.



CHIEF OF POLICE
CHIEF OF FIRE

OTTAWA

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

PLANNING MEASURES TO SAFEGUARD SOLAR ACCESS FOR BUILDINGS IN OTTAWA

Summary of Discussion Paper CD-164-6

The City's Energy Conservation Policy, approved by Council as By-law 162-81, consists of the following goals:

1. Increase the awareness and promote the co-operation of the public in energy conservation;
2. Amend the Official Plan and promote energy-efficient planning;
3. Increase the efficiency of transportation and reduce its dependence on non-renewable energy sources;
4. Extend and publicize conservation in the public sector, to set an example for the private sector.

The protection of solar access for buildings in order to allow their owners to utilize the energy reaching us continually from the sun, is an aspect of Goal 2 and the objective of this study is to explore the options available, to establish a simple way of regulating such access and investigate some likely impacts of solar access regulations. The underlying assumption is that the largest possible number of energy consumers should have the opportunity of utilizing the abundant energy of the sun, because with nearly 2000 hours of sunshine per year, Ottawa is more fortunate than Windsor and Vancouver in this respect.

The case in favour of solar access protection rests first and foremost on the considerable savings likely to accrue to householders in retrofitting an existing home in the Glebe, Ottawa South or Westboro - the areas on which the study is focussed for solar access applications. Over a five-year period, the installation and running costs of a solar heating system show a saving of some \$4,200 over equivalent costs for an oil system. Solar access protection would encourage a householder to invest in this type of retrofitting without fear that his expensive solar collectors would be continuously under the threat of being overshadowed by a new structure or some vegetation growing in their vicinity. In accordance with the location of collectors, there are four levels of solar access protection, as follows:-

- 1) **ROOFTOP SOLAR ACCESS PROTECTION:** The simplest and least controversial, because in a residential area of say, 2-storey houses the possibility of conflict between adjacent homes obscuring each other's rooftop solar collectors is minimal.
- 11) **SOUTH WALL SOLAR ACCESS PROTECTION:** This may necessitate lower residential densities, or specially designed roof and house shapes to protect the solar access space available to a neighbouring house.

- iii) SOLAR ACCESS PROTECTION FOR PARTS OF A LOT allows the installation of solar collectors at ground level. This is obviously a more stringent requirement as the safeguarding of access space all the way to the ground surrounding a neighbour's house, necessitates a large lot, a distant position and perhaps even a special roof or building shape for a house. All these requirements obviously spell more dollars and cents.
- iv) SOLAR ACCESS PROTECTION FOR ACCESSORY BUILDINGS allows the installation of solar collectors on garages and other outbuildings. This may appear to be less critical until one considers greenhouses, which may become an important source of fresh food for a household in the future, as food becomes increasingly more expensive.

Each of these may suit a different area of the City in accordance with 8 factors enumerated in the study - (i) and (ii) above for example, appear to be suitable for most of the Glebe; (i), (ii) and (iii) for most of Ottawa South; but for Westboro the choice is less clear. An important factor in the choice of protection level is likely to be the reaction of citizens. The case in favour of protection is concluded with the enumeration of potential indirect benefits of solar access protection: Employment growth and diversification, encouragement to innovative designers, more variety in the urban scene, etc. The simplest method of legally establishing the 'right to light' is considered to be SOLAR ACCESS ZONING to overlay existing land use zones in the city with some new requirements affecting building height, bulk, location, landscaping, etc.

The case against solar access protection consists of social, political, economic, environmental and legal arguments. 'Blanket' zoning may not be considered fair, for example, because certain locations are more advantageous than others and this may give rise to disputes among neighbours. Politically, solar access protection may compound and perpetuate existing inequities in land ownership and be used as an instrument for extracting more taxes. Restrictions in development imposed by solar access zoning will certainly affect employment prospects in the building industry and the effect on the urban environment and vegetation may be quite profound:- incongruent shapes and surfaces, vandalized solar collectors, lopped trees and dwarf bushes, etc. As a legal means of ensuring solar access, zoning may be simple, but in its day-to-day application, it could well give rise to disputes and delays and thus procrastinate the development control process.

The controversy as to whether solar access for buildings should be legally protected, may be resolved only through public debate and no preference is therefore indicated in the study. It is proposed to discuss the pros and cons and the suitability of various levels in solar access at a series of public meetings in the Glebe, Ottawa South, Westboro and elsewhere, in order to increase public awareness and gauge community feeling on the matter. Comments and summaries of the discussions held in these communities will subsequently be submitted to the Council, together with any recommendations for future action.

DID YOU KNOW ?

THE SUN IS SHOWERING

MONEY

ON OUR HOMES...

**BUT... WE FIRST NEED TO PROTECT
OUR RIGHTS UNDER THE LAW**

COME TO THE MEETING ON

SOLAR ACCESS PROTECTION

AT THE COMMUNITY CENTRE

690 LYON ST.

Tuesday, Feb. 2 82
at 7:30 pm

SAVIEZ VOUS ?

QUE LE BEAU SOLEIL

NOUS DONNE UNE PLUIE DE CHALEUR

QU'ON PEUT UTILISER DAN NOS FOYERS...

**MAIS IL FAUT PREMIÈREMENT NOUS
ASSURER DES DROITS D'ACCÈS AU SOLEIL**

VENEZ ASSISTER À LA REUNION

PROTEGEONS NOTRE ACCÈS AU SOLEIL

AU CENTRE COMMUNAUTAIRE

690 LYON

Le mardi, 2 février 82
à 19h30

**City of
Ottawa**



Advertisements on the public meetings on solar access protection were placed in the local community newspapers and in "The Ottawa CITIZEN" as shown below. The announcement in the CITIZEN appeared as a CONSERVATION PIPELINE article - a regular series which forms part of the City's Community Outreach programme on Energy Conservation.

January—February



Protecting your home's right to the sun

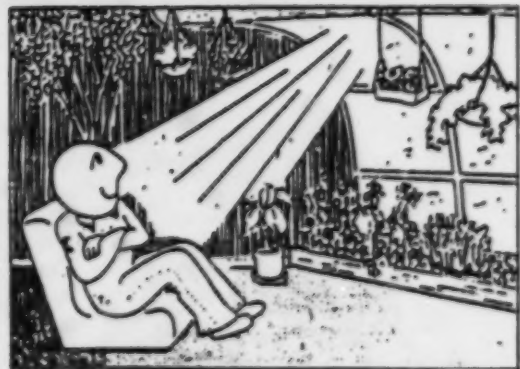
Does it make sense to you?

Every new invention brings with it novel opportunities, new rights and obligations. The sun has been shining on the earth for millions of years, but technology is only now making it possible for us to use that endless source of energy. Solar collectors may be rather expensive at present, but mass production and competition between manufacturers will soon allow every household to use the sun in some way, if only for growing vegetables to beat inflation in the backyard greenhouse.

In the meantime, we could attempt to safeguard the right of every household to enjoy the sun. Building extensions, growing trees and tall new structures could seriously obstruct this valuable source of energy. Would it be feasible to establish a RIGHT TO SOLAR ACCESS for building? How would this affect the environment, existing trees or any extension you may be considering for your home? How is the building industry likely to be affected? These are highly controversial matters on which we would like to hear from you.

Are you in favour of solar access protection?

Write or call the Energy Planner, City Hall,
111 Sussex Drive, Ottawa K1N 6A1 (583-3000).



Energy Ed's advice this month is:
If you enjoy basking in the sun, you should certainly enjoy discussing the problems of protecting solar access.
Please attend the meeting at your nearest Community Centre at the following times:
266 Sunnyside Ave.; 7:30 p.m.; Thursday,
January 21, 1982.
411 Davenport; 7:30 p.m.; Thursday,
January 28, 1982.
696 Lyon Street; 7:30 p.m.; Tuesday,
February 2, 1982.

MINUTES OF A PUBLIC MEETING
ON SOLAR ACCESS PROTECTION IN WESTBORO
HELD AT THE WESTBORO COMMUNITY CENTRE
411 DOVERCOURT AVENUE
THURSDAY, JANUARY 28, 1982 AT 7:30 P.M.

1. The meeting was started at 7:45 p.m. by Alderman Denison.
2. Alderman Denison gave a brief account of what the City has been doing to encourage energy conservation and the reduction of reliance on non-renewable types of resources.
3. Mr. Armen gave a brief outline of what was to be accomplished at the meeting saying that the long-term objective was to establish a by-law on Solar Access Protection (if the majority of the public felt that such a by-law was warranted), discuss what elements should be included in such a by-law, and have these elements drafted into a report and sent to the Legal Department and Council. This by-law would then be given a trial application for an experimental period of 3 to 6 months. He suggested that a committee be selected at the end of the meeting to discuss the various elements of the Solar Access Protection By-law for Ottawa over a number of working session in the near future.
4. Mr. Armen gave a brief history of Solar Access Protection and what it meant, giving examples of such protection legislated in other times and other places. He said that it was everyone's right to enjoy the sun and its benefits, stating that various legal methods had been studied and zoning had come to be considered as the least complicated.
5. A film was then presented (THE SOLAR FRONTIER) giving examples of various methods of harnessing the sun for space and domestic heating. Advantages of solar heating were also shown in the film; i.e., avoidance of pollution, economic self-reliance and payback of capital outlay.
6. Mr. Armen also gave a brief account of possible disadvantages of solar access protection:
 - a) May penalize development.
 - b) May give rise to disputes between neighbours.
 - c) Could cause environmental problems (i.e., visual pollution).
 - d) Density is limited once solar zoning is established.

7. Various questions and comments were raised regarding problems with solar access zoning:

- It was stated that once solar access zoning had been established, developers would probably be reluctant to build in the area. It was said that the developers would probably feel that if they were limited to what height they could build, they would also be limited to the amount of money they could make as well.
- A question was raised regarding what would be the rights of property owners of existing buildings and trees, etc., once the solar access by-law is established, if those buildings do not conform with that by-law. It was replied that a building would have a legal non-conforming right. This by-law would only apply to new buildings under construction. Once a building has been established, it can't be torn down.
- There were questions raised regarding the right to solar access versus the right to the development and full utilization of one's own property.

8. Mr. Armen gave a slide show presentation on Energy Conservation and the City's Energy Conservation Policy. There were four main goals:

- 1) Increase Public Awareness.
- 2) Permit energy efficient planning in both the public and private enterprise projects for urban renewal and new development.
- 3) Increase the efficiency of transportation and reduce its dependence on non-renewable energy sources.
- 4) Extend and publicise energy conservation in the public sector to set an example for the private sector.

Specific objectives were outlined for each of these goals. Included in these goals was the setting up of solar access zoning in each of the three areas of Westboro, Glebe, and Ottawa South.

Two methods of utilizing the sun were also presented in the slide show: (1) Actively: (i.e., by means of collecting the sun's heat mechanically or chemically and storing it for later), or (2) Passively: (i.e., sunlight being absorbed by walls and floors during the day then at night curtains being drawn to contain the heat).

These slides also indicated the effect of solar zoning on housing density and gave a preview of the type of study to be carried out with the Committee to be formed.

9. Volunteers were then asked to form a local Solar Access Committee to deal with the various elements of solar access protection in Westboro. Mr. Armen informed the meeting that the purpose of the committee would be to provide a liaison between the Westboro community and the City, getting feedback from the citizens by means of polls and surveys, etc. on problems encountered and the necessity or otherwise for solar access zoning in various areas of the community. The committee would hold approximately three or four meetings and in general act as a sounding board for the community.

10. The following people volunteered to sit on the local solar access protection committee:

1. Mr. Peter Fitzgerald, 268 Duncairn Avenue, H:729-1266; B:231-6345.
2. Mr. Don Smiley, 829 Duberry Street, H:722-8617.
3. Ms. Agnes MacIntosh, 69 Huron Avenue N., H:722-5338; B:593-6127
4. Mr. Dave MacKay, 220 Dovercourt Avenue, H:722-5817;
B:725-3800, Ext. 424.
5. Mrs. Betty MacKay, 220 Dovercourt Avenue, H:722-6817; B:994-2866.
6. Mr. Chuck Jackson, #2-265 Currell Avenue, H:722-4090; B:729-3116.

It was stated that if anyone else wished to be on the Committee, he could call or write to Gary Armen, Energy Planner, City Hall, 111 Sussex Drive, Room 502, 563-3000.

11. It was suggested that means be established through which the community at large could be informed of the various decisions of the Committee. NEWSWEST was considered highly suitable for this purpose.
12. The next meeting for the local committee on solar access protection for Westboro is tentatively scheduled for Thursday, February 11, 1982 at 7:30 p.m. in the Westboro Community Centre.

PUBLIC MEETING ON
SOLAR ACCESS PROTECTION
IN WESTBORO

Thursday, January 28, 1982
7:30 p.m.

AGENDA

-
1. Introduction Alderman D. Denison
 2. Film:
THE SOLAR FRONTIER
 3. Slide show:
PROBLEMS AND OPPORTUNITIES
WITH SOLAR ACCESS PROTECTION
(coffee) Gary Armen
(Senior Energy Planner)
 4. Questions and Answers
 5. Selection of a local Committee on Solar Access
 6. The next steps Gary Armen
-

COMMENTS:

1. Are you in favour of protecting solar access? yes ☐
no ☐
2. Please comment on the procedure outlined at the meeting to establish a
By-law for an experimental period.

3. The presentation was simple to follow ☐
too technical ☐

4. Other comments:

The agenda for each public meeting is shown as a reduced diagram below. The aim in the sequence of various items was to make each meeting an audio-visual experience and a continuously growing and strengthening dialogue with the audience. It was considered essential to initiate dialogue, to the point where people felt encouraged to participate in the study itself by becoming members of the Local Advisory Committee. It is worth noting that in everyone of the selected areas, the membership of the elected committee exceeded the minimum number stipulated by the Chairman of the meeting - the Ward Alderman. The comments received in the lower half-part of the Agenda were numerous and quite encouraging, as shown by the sample below.

2. Please comment on the procedure outlined at the meeting to establish a By-law for an experimental period.

SEEMS REASONABLE

3. The presentation was simple to follow ☒
 too technical ☐

4. Other comments: Finally!!

3. The presentation was simple to follow ☒
 too technical ☐

4. Other comments: Mr. Arman has just the right
manner to encourage participation

4. Other comments:

It would appear from attendance at 5
meetings that the neighbourhood has
not been sufficiently informed of the
study that is underway. This must be
done before real community feedback
can be expected.

The procedure followed at all public meetings was identical and the minutes reproduced in the following page could be said to be representative of the discussions, the range of questions and answers exchanged and of the prevailing informal atmosphere in all of them. The attributes of "THE SOLAR FRONTIER" as a relevant film for the occasion cannot be under-estimated. It gives a simple, down-to-earth account of the achievements of three solar design pioneers in active and passive solar heating. It reveals the immense potential offered by solar energy and succeeds in making that potential appear quite accessible, the only prerequisites being imagination and south exposure. The need to protect solar access was by implication quite evident and judging by the questions following the film show, people felt eager to be involved in the innovation of solar energy utilization.

The purpose of the slide show on PROBLEMS AND OPPORTUNITIES WITH SOLAR ACCESS PROTECTION was to reinforce the impressions of the film by proving to the audience that "it is all here and now is the time to act". The conclusions of Discussion Paper CD-164-6 were emphasized and reference was made to the findings on the local area, inviting questions and pointing the need for further study. One recurring theme in the meetings was the City's aim of involving local residents in order to ensure that the value people placed on local trees, buildings and architectural traditions was fully considered.

Following 20-30 minutes of dialogue through questions and answers, the stage was set for the selection of a Local Advisory Committee on Solar Access. Persons would either volunteer or would be proposed and seconded by others for membership of the Committee. A total of 6 persons formed the Committee in Ottawa South, 5 in the Glebe and 7 in Westboro.

The steps to follow this public meeting were outlined very briefly to indicate the frequency of working sessions, the availability of funds and equipment to carry out special studies and the necessity of winding up with at least one other public meeting to report on the Committee's findings and conclusions. It was stressed that a Committee would be entirely free to present majority and minority views as to whether solar access protection for the area should be recommended to City Council and to suggest provisions accordingly.

All meetings ended with an agreement as to the date and venue of the first working session of the Advisory Committee.

EARLY WORKING SESSIONS WITH THE ADVISORY COMMITTEES

These were spaced at approximately 3-weekly intervals and allowance was made for at least one joint session with all three Committees attending, after some promising direction had been found by each. Following the first few sessions, Glebe and Ottawa South Committees joined up to form the Capital Ward Committee,

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EARLY WORKING SESSIONS WITH THE ADVISORY COMMITTEES

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because their views converged in favour of making solar access a property right in the City. Westboro Committee on the other hand, decided to pursue a land-use zoning approach to solar access protection. As the latter coincided with the Council's proposal for research under the Energy Conservation through Land-Use Planning programme (ECTP), the emphasis throughout the rest of this report will be placed on the work and results produced by the Westboro Committee on Solar Access Protection.

WORKING METHOD OF THE WESTBORO COMMITTEE

The membership of this Committee consisted of a number of diverse, yet highly relevant disciplines to solar access protection - e.g. economics, landscape architecture, energy-efficient homes and greenhouses, astronomy, law, fauna and flora, nuclear energy (and the dangers thereof), food chemistry and last but not least, a common interest in gardening. This diversity of specialized interests, added to a highly constructive attitude, brought about a "networking approach" to the resolution of various problems the undertaking of various tasks and the final formulation of recommendations.

"NETWORKING"

Fischer et al (1977) have defined a "network" as "...a web of social bonds that radiate outward to the people whom we know intimately". Bradshaw (1982) has extended this to planning and provided a code by suggesting that:

"it means: 1) aim for information rather than emotion support (e.g. using it only to gain agreement with one's own view of things), 2) be available to the others when they need information and feedback, and 3) be discrete in the use of information, although it is not necessary to be secretive, just SUBTLE, as William Ouchi (1981) author of "THEORY Z" would say."

A definition which has directly arisen from the experience at Westboro has been provided by Armen (1982) in the following passage read at the 1982 CIP Annual Conference, in the context of energy-efficient community planning:

"Individuals who profess to a local expertise will be invited to become members of the local advisory planning committee, carry out a local study related to their expertise and prepare appropriate recommendations for the community plan. Naturally, these will have to be acceptable to the local committee, the Community Development Department and the Council, before becoming part of Official Plan amendment. But group and individual involvement of this type will ensure that the participants in local plan revision, place a stake in its successful implementation and the wider this network of experts, the higher the sense of involvement and personal stake in favour of implementation is likely to be."

WESTBORO COMMITTEE STUDIES

At its first working session the Westboro Committee discussed the City's ECTP research programme on "Solar Access Protection in Built-Up Areas", as approved by the Council and the Ministries of Energy and of Municipal Affairs and Housing. Subsequently they adopted various committee procedures and discussed the Programme of Work shown overleaf. It was agreed to introduce some flexibility whenever local circumstances warranted and to have a regular feedback and liaison with the other two committees for a useful exchange of ideas. Under this programme and on the basis of networking, the following studies were carried out and discussed at each of the working sessions:

- February 11, 1982:
- Existing levels of solar access in various parts of Westboro.
 - Compensatory provisions for corner lots and other problem areas: Part(s) of lot could be made a 'Protected Garden' for solar access.
 - Approximate levels of current energy use and annual cost for principal house types in Westboro.
- February 18, 1982:
- Study of local trees in terms of shading and growth characteristics. (Appendix 3).

PROGRAM OF WORK WITH LOCAL
ADVISORY COMMITTEES ON
SOLAR ACCESS PROTECTION

1. Levels of Solar Access

- a. Currently in force under existing zoning;
- b. Feasible for various proportions of housing in the area;
- c. Difference between (e) and (b) and implications.

2. Surveys

- a. Current energy use and annual cost;
- b. Problems due to existing trees;
- c. Problems due to existing buildings;
- d. Shadows cast by buildings and trees - angles, duration, etc.

3. Characteristics of shading in the community

- a. Interface between zones;
- b. What proportion of buildings is shaded?
- c. Corners and other problem areas;

4. Possible conflicts

- a. Current and future density;
- b. Existing tree preservation policies;
- c. Inequality of solar access in various parts of each city block;
- d. Existing tall buildings and problems created;
- e. Compensation for disadvantaged locations;
- f. By-law regulations and standards which restrict solar access;
- g. Developers vs. residents - what is the possible accommodation to be made by each towards a compromise.

5. Conclusions

- a. List of elements for inclusion in By-law;
- b. Policies recommended by the Committee on Solar Access Protection;
- c. Solutions developed or suggested for problems areas;
- d. Process to increase public awareness and promote public debate on the Draft By-law.

G. Armen
February 1982

- How should existing trees be treated - as opposed to new trees, planted after the passage of a Solar Access Protection By-law?
- How should fences be treated if they obscure part of a "Protected Garden".
- Treatment of existing and heritage buildings under a Solar Access Protection by-law.
- Angle of slope for the ceiling of development to protect solar access.
- Effect of the above angle on the volume of tall buildings.
- Ceiling of development in R3, R4-x and R5-x zones under AZ-64 (Ottawa Zoning By-law).
- How could height be controlled without a decrease in the total of accommodation units in an apartment block?
- Existing and future housing densities in Westboro.

March 4, 1982:

- By-law 162-73 on the preservation of trees and the manner of their removal after they die.
- Possible notification procedures to warn surrounding residents of an impending tall structure in their vicinity.
- Existing and forthcoming tall buildings in Westboro and problems they create for equitable solar access - conflict of "residents vs. developers".
- Possible compensation for solar-access-disadvantaged lots.

March 11, 1982:

- Procedure for pruning existing trees to ensure solar access.
- Duration of unacceptable obstructions before a property owner may object.
- Process of thinning and tree removal following objection by owner of a solar collector.
- Percentage of acceptable obstruction by existing vegetation on a solar collector.

- Fair method of showing shade to be cast by a proposed building, in order to inform surrounding residents.
- SOLAR ENVELOPES - i.e. developable space envelopes for solar access protection - types and shapes devised by various municipalities (Atlanta, Hamilton, Brampton).
- Non-conformance problems with existing and heritage buildings as regards solar access.
- Number and typology of Heritage Buildings and Designated Trees in Westboro.
- Critical Sun Altitude for Ottawa ($21^{\circ}.09'$ at 9 a.m. on December 21).
- Azimuths yielding maximum solar radiation in Ottawa.
- Definition of SOLAR COLLECTOR SURFACE - in terms of size and radiation requirements for viable operation.

March 25, 1982

- Heliodon tests of shading effects produced if Solar Envelope roof were sloped at the angle of Ottawa's Critical Sun Altitude.
- Modification of Solar Envelope angle to $21^{\circ}.30$ and further tests.
- Testing of SOLAR ENVELOPE (as determined for Westboro) and SOLAR WINDOW (as devised by Capital Ward Committee member) concepts on a sample of 60 homes in the selected trial areas by the employment of a consultant.
- Final list of elements for inclusion in the Model By-law.
- Review of solutions proposed for problem lots or properties:
 - Transfer of 'protected garden'
 - Non-conforming existing trees
 - Non-conforming existing buildings

Each of these studies resulted in a provision which was inserted in the draft Principles for Solar Access Protection. Following the refinement of the angle determining the pitch of the roof of the Solar Envelope - through experimentation with the heliodon - and the testing of the Solar Envelope on a

sample of 60 homes, the Committee decided to present the entire package to a group of experts at a public meeting.

PUBLIC MEETING ON DRAFT PROVISIONS
FOR SOLAR ACCESS PROTECTION

This was organized by the Solar Energy Society of Canada Inc. (SESCI) and the City of Ottawa to bring together a number of experts in the field of solar access and obtain their reactions to the draft proposals worked out by the Capital Ward and Westboro Committees on Solar Access Protection. The advertisement, agenda, progress report and summary of proceedings are shown in the following pages.

GA:smr-3

A2D044

conservation pipeline

The Right to Sunlight

The last article in this series asked whether it would make sense to protect your home's right to the sun. The number of favourable phone calls and letters to the City Energy Planner made it abundantly clear that the time was ripe to study the feasibility of such protection. Early in January, local advisory committees were set up in Ottawa South, Westboro and the Glebe and they made suggestions as to what should be included in a by-law to establish each property's right to sunlight.

After some three months' work with local experts studying trees and zones, heritage buildings and solar angles, fences and hedges and what-have-you, the committees have now developed two schemes for protecting your homes right to sunlight. A summary of these schemes will be distributed and a large meeting is planned to discuss them in public.

Can you afford to miss this meeting?

The right to sunlight will open a wide range of new opportunities to enjoy at home. You will be able to build a greenhouse to grow your own food, or a solarium in which to relax and get a sun tan. Alternatively, you may prefer to fit large, south-facing windows to heat your living room in winter and if you are really keen on 'going solar,' you may experiment with solar collectors to give you space or water heating, or both. Hundreds of householders have already done so in the Ottawa Valley without even waiting for their right to sunlight to be protected.

Come and Discuss Your New Property Right—the Right to Enjoy the Sun

A Public Meeting on the Right to Sunlight

Organized by SESCO* Ottawa and the City
at 7:30 p.m. Thursday, April 29, 1982
at the Glebe Community Centre (890 Lyon Street)



For enquiries call: The City Energy Planner: 563-3000
or, SESCO* Program Co-ordinator: 746-7144 (evenings)

*The Solar Energy Society of Canada Inc.



OTTAWA

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111 SUSSEX DRIVE

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111, PROMENADE SUSSEX

K1N 5A1

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

THE RIGHT TO SUNLIGHT

A PUBLIC MEETING ON THE FEASIBILITY OF SOLAR ACCESS PROTECTION
FOR PROPERTIES IN OTTAWA
(Organized by SESCO Ottawa and the City of Ottawa).

THURSDAY, APRIL 29, 1982
GLEBE COMMUNITY CENTRE
(690 Lyon Street)
at 7:30 p.m.

7:30	INTRODUCTION Objectives of the Meeting	Linda Newell SESCO Ottawa
7:45	THE ROLE OF THE PROVINCE	Jane Allen Energy Advisor Ontario Ministry of Energy
8:00	THE ROLE OF THE REGIONAL MUNICIPALITY	Carol Christensen Planner, R.M.O.C.
8:15	PROTECTING SOLAR ACCESS IN THE U.S. Procedural models	Michael Weinstein Consultant M. Weinstein & Assoc.,
8:30	SOLAR ZONING A legal perspective	Paul Webber, Q.C. Barrister
8:45	PROGRESS REPORT ON SOLAR ACCESS PROTECTION IN THE CITY OF OTTAWA	Gary Armen Senior Energy Planner City of Ottawa
9:00	PANEL DISCUSSION In response to questions from the public.	
10:00	End of meeting	



SOLAR ENERGY SOCIETY OF CANADA INC.
SOCIÉTÉ D'ÉNERGIE SOLAIRE DU CANADA INC.

THE CANADIAN SECTION OF THE INTERNATIONAL SOLAR ENERGY SOCIETY.
LA SECTION CANADIENNE DE LA SOCIÉTÉ INTERNATIONALE D'ÉNERGIE SOLAIRE

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ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

PROGRESS REPORT ON SOLAR ACCESS PROTECTION

Background

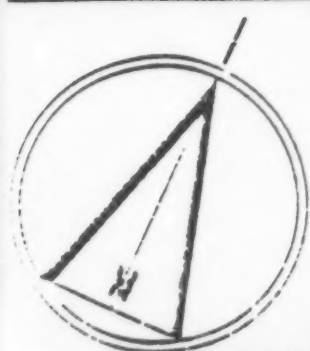
The idea of protecting the right to sunlight for properties in the City was suggested by the Ottawa South Community Association in the course of a neighbourhood study in 1977-78. The Council approved the resulting Ottawa South Neighbourhood Plan in 1979, including a recommendation to initiate a study to establish the feasibility of solar access protection.

In March 1981, the Energy Planning Section of the Community Development Department issued Discussion Paper CD-164-6 titled PLANNING MEASURES TO SAFEGUARD SOLAR ACCESS FOR BUILDINGS IN OTTAWA. The objective of this study was to explore the options in solar access, establish a simple way of regulating it and investigate some possible impacts of such regulation. Four options on levels of solar access were considered - Rooftop, South-wall, Parts-of-lot and Accessory-building. The simplest method of legally establishing the 'right-to-sunlight' was considered to be SOLAR ACCESS ZONING to overlay existing land use zones in the City with specific requirements affecting developable space and landscaping in and around a lot. The possible impacts of such zoning were assumed to range from the social, economic and environmental, to some delay in the development control process. It was concluded that only by monitoring actual events following enactment, could these impacts be properly evaluated.

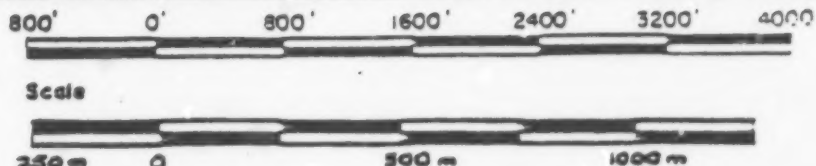
Objectives

In October 1981, Ottawa City Council approved an application for an Energy Conservation Through Land-use Planning (ECTP) grant from the Ontario Ministries of Energy and of Municipal Affairs and Housing to carry out research on SOLAR ACCESS PROTECTION IN BUILT-UP AREAS with the following objectives:-

1. To protect solar access for all properties, as equitably as feasible in an existing built-up area.
2. To ensure proper conditions for the development of the local environment, at a time of transition from reliance on fossil to renewable sources of energy for domestic water and space heating.
3. To ensure that the social, economic and environmental concerns of all interest groups in the community are duly considered.



Grid of
sample
homes



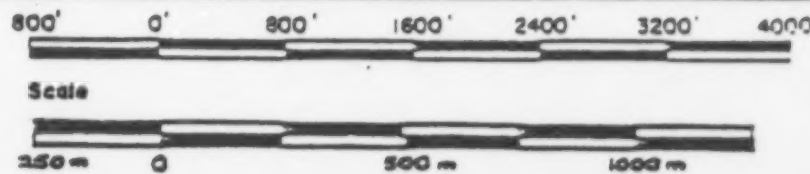
CAPITAL WARD

P.B. 666

RIVER



Grid of
sample
homes



WESTBORO AREA

P.B. 662

In view of these objectives, the program for this research included the setting up of local advisory committees in three trial areas - Ottawa South, Glebe and Westboro - to develop measures particular to each area, enactment of area-specific by-laws and monitoring of their performance to help evaluate their impact. Reasons for the selection of these areas included the dominant direction of streets (North-South in Westboro and East-West in the others), the loyalty of residents to these areas and the presence of heritage buildings and trees. All information and concepts should be considered interchangeable between committees to ensure the most workable by-law for each area.

Progress To-Date

In January 1982 a positive response to the application was received and the local advisory committees were set up. Ottawa South and Glebe Committees joined up as Capital Ward Committee and studied a number of north American by-laws on solar access. Subsequently, they suggested some concepts of protection, which after a number of technical tests and adjustments could serve as the basis for by-law enactment. "Their main concern has been to balance the quality and extent of solar protection with restriction on development and the enhancement of ones environment (trees)." Westboro Committee preferred to discuss one by one various matters affecting solar access, develop a concept and set up principles and procedures which could be considered by the City's Legal Department towards drafting a by-law for their area.

The concepts considered by Capital Ward Committee at present are the SOLAR WINDOW and INCLINED PLANE along with the SOLAR ENVELOPE favoured by Westboro. Westboro Committee have set up a number of criteria to evaluate the concept of the SOLAR ENVELOPE and compare it with the SOLAR WINDOW. They propose to obtain comment on the principles and procedures they have formulated as part of a solar access protection by-law at the public meeting on April 29, 1982. Should comment be favourable, these principles and procedures will be considered by the Legal Department at City Hall and a by-law will be drafted for approval by the Council.

1. THE SOLAR WINDOW CONCEPT

A person standing behind a window and looking out at an angle of vision of 90° from one jamb of the window to the other, will be receiving about 85% of the solar energy available on the critical day of December 21, provided the sun is totally unobstructed.

The Solar Window concept would be valid if the obstruction due to buildings and trees in a built-up area was minimal. It therefore states:

"The Solar Window between the months of September, December to March shall not be obscured more than X% on the Solar collector."

The key percentage was established by visiting a total of 66 homes, evenly distributed over the Ottawa South, Glebe and Westboro areas as shown on the attached two maps. Looking through second floor windows located on the easterly, southerly and westerly walls of each house, an evaluation was made on the basis of the following criteria:-

A. CRITERIA RELATED TO PROPERTY UNDER CONSIDERATION

1. What is the percentage of unobstructed skydome on the East, South and West sides of a lot;
2. Would solar access protection be possible for a depth of 5.00 m. below soffit level?
3. Ditto, for 3.00 m. depth;
4. Ditto, for 1.50 m. depth;
5. Is protection of 10% of the lot area possible on the East, South or West side;

B. CRITERIA RELATED TO SURROUNDINGS

6. Would extension of the neighbouring home on this side be possible?
7. Would the design of such an extension be easy? (free of complicated shapes)
8. Would development beyond the neighbouring lots be possible?

The results of this evaluation are shown on Table 1.

11. THE SOLAR ENVELOPE CONCEPT

The Westboro Committee favoured the concept of establishing a Solar Envelope of Developable Space for each lot (as shown on Attachment 1) and thereby require only a Zoning By-law Amendment for Solar Access rather than a completely new By-law. This would by-pass the need for enabling legislation from the Province. The principles and procedures they assembled were as follows:

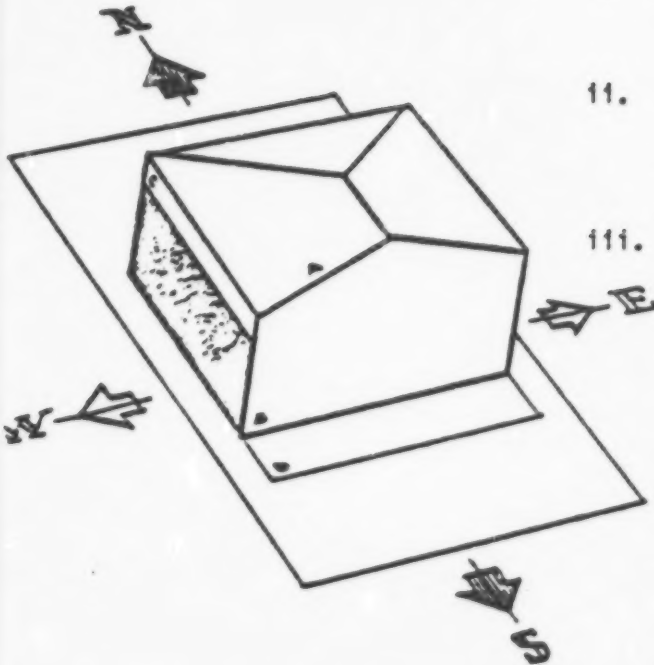
DEFINITIONS

1. SOLAR COLLECTOR: A material surface exposed to sunlight, measuring at least 60 x 60 centimetres or 3600 square centimetres in area and forming the cover of an enclosure, in which, by passive or active means, it generates 'the greenhouse effect'.
2. SOLAR ENVELOPE: A graphic or model representation of the maximum acceptable volume of development on a lot. This volume is defined by Zoning By-laws applicable to that lot and it is only modified in shape by the present Amendment to these by-laws. (See Attachment 1)

PROTECTED SURFACES

3. The purpose of this By-law Amendment is to modify land-use zoning in order to ensure that any proposed development in the vicinity of a property, allows a minimum of 6 hours of sunlight from 9:00 a.m. EST to 3:00 p.m. EST on December 21 to reach the following surfaces of that property:

- i. SOLAR COLLECTORS located anywhere on the roof (A) and the south-facing wall (B) of a principal building on a lot;
- ii. A depth of 60 centimetres from the soffit (C) along the east and west elevation of a building and designated as EAST AND WEST SOLAR STRIP;
- iii. An area not exceeding 10% of the total area of the lot (D) and designated as PROTECTED GARDEN. This Garden shall be assumed to adjoin the south side of the principal building in a lot and measure the full dimension of that building on that side, multiplied by the appropriate width to give an area equal to 10% of the lot area. Part or the whole of a Protected Garden may be transferred to any other part of a lot by writing to the City Energy Planner, who will notify the owners of all properties surrounding the subject lot, within 21 days of the date of registration of a transfer.



EXISTING NON-CONFORMING STRUCTURES AND FLORA

4. After the passage of this by-law amendment, all existing structures and flora will be accepted as non-conforming. All existing flora outside the Solar Envelope may continue to grow, subject to the provisions of Article 9 below. Any replacement following destruction by natural or other causes however, shall be expected to conform.

COMPENSATORY PROVISIONS

5. Properties affected by buildings in a commercial zone, or a non-conforming structure or flora, shall be granted compensatory solar access protection over a larger Protected Garden or over an accessory building, or other suitable area. Such compensatory protection shall be secured through the modification of Solar Envelopes in adjoining lots and it shall be equivalent in area to the area shaded by the commercial zone, non-conforming structure or flora. Where no protection is feasible, the City shall make an allotment garden available as a priority case and with normal provisions.

CONTAINMENT WITHIN A SOLAR ENVELOPE OF DEVELOPABLE SPACE

6. All new development or addition to an existing development shall be contained within the Solar Envelope appropriate to a lot. (See Attachment 1)

VARIANCE, NOTIFICATION AND PUBLIC HEARING

7. A variance shall be sought from the Committee of Adjustment for any proposed development or part of a development, which exceeds the volume of the Solar Envelope and casts a shadow obstructing 15% or more of the area of a Protected Surface. (The Planning Branch will prepare diagram(s) of the shade to be cast by the proposal on December 21 at hourly intervals from 9:00 am EST (shade measuring 7.2 times actual height of the proposed development) through 12:00 noon EST (shade = $2.5 \times$ height) to 3:00 pm EST (7.2 times height). The diagram(s) will be circulated for comment to all residents or tenants affected by the shade drawn. The notice accompanying the diagram(s) shall explain the proposal and the right to object, in plain English, free of technical jargon. Any objection for trespass on a surface protected for solar access shall result in a public hearing of the case).

PERMIT AND INSPECTION

8. A property owner or agent wishing to retrofit passive or active Solar Collectors on an existing structure shall submit a drawing showing the entire installation in plan(s) elevation(s) and section(s). The structure will be inspected to ensure adequate stability and bearing capacity for the proposed system of collectors, before a permit is issued to install that system. This permit shall contain the following provisions to be signed by the applicant:-
 - i. that every precaution shall be taken by the applicant to render the Solar Collectors safe against vandalism;
 - ii. that he shall undertake to replace or remove a damaged Collector within 90 days from the date of notice to do so by the Council;

OBSTRUCTION BY GROWING FLORA

9. Any existing or new flora which, through natural growth after the passage of this amendment, exceeds the permitted 15% obstruction of sunlight to a Solar Collector on December 21 shall be liable to cutting, thinning or pruning, following certification of trespass by the City Tree Officer and due service of a notice. Failing compliance by the owner of the flora, the City Tree Officer shall execute the work and charge 50% of the expenses to the owner of the flora and 50% to the owner of the Collector. Subsequent offences however, shall be chargeable to the owner of the flora alone, to provide incentive for complete removal.

NEW FLORA

10. Replacement of existing flora, following complete removal, shall be guided by the requirements of the Solar Envelope, climate-conscious landscaping and the list of desirable flora to be attached to the By-law.

FENCES AND HEDGES

11. Property line fences or hedges exceeding the permitted 15% obstruction of sunlight shall conform to the provisions of this By-law.

HERITAGE BUILDINGS AND HIGH STRUCTURES

12. Heritage buildings and buildings in C1 commercial zones shall become non-conforming structures and all provisions mentioned in (5) above shall apply to affected properties in their vicinity. Buildings in commercial and residential zones allowing a height of more than 10.70 m shall conform with provisions (6) and (7) above.

CITY PROPERTY LINE

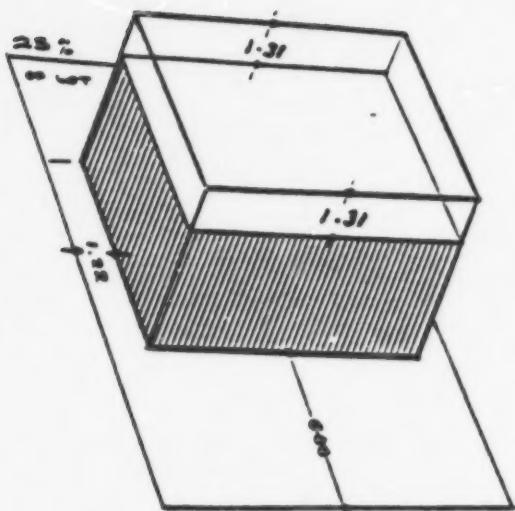
13. Installation of Solar Collectors within the municipal road allowance shall be permissible through application to the Commissioner of Physical Environment for an encroachment permit.

APPLICATION

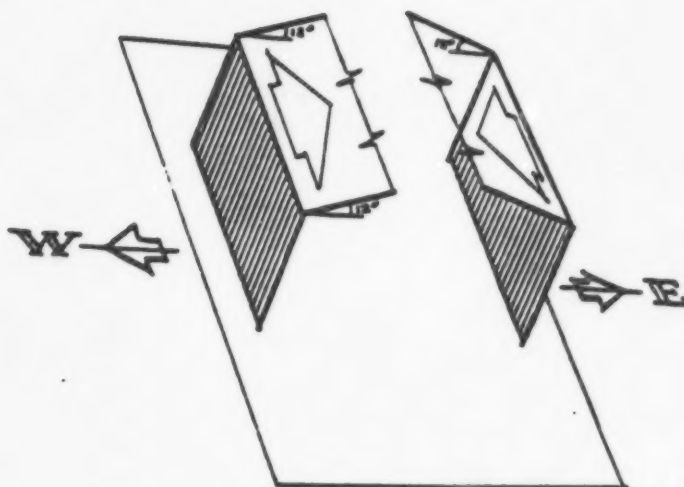
14. The City and its various agencies shall be bound by this By-law amendment.

The performance of the SOLAR ENVELOPE was tested on the same sample of properties as the SOLAR WINDOW and its possible impact evaluated on the basis of the above mentioned criteria. The results are shown on Table 1 for convenient comparison.

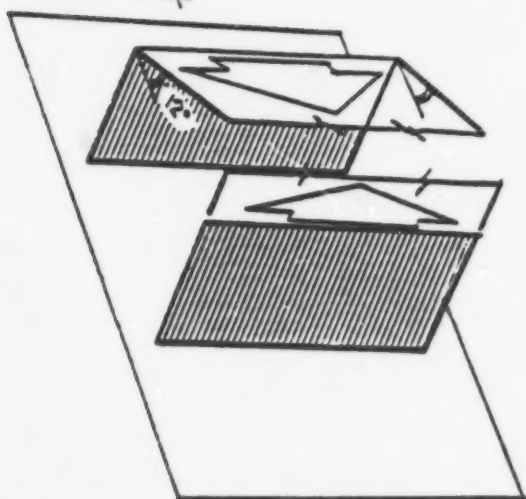
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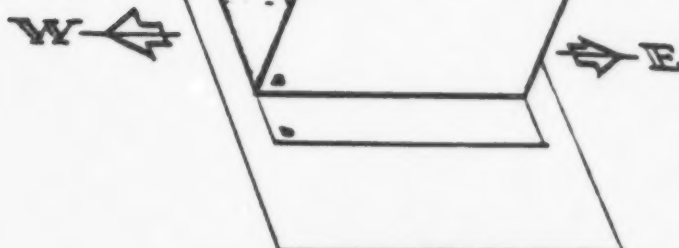
steps 1,2,3



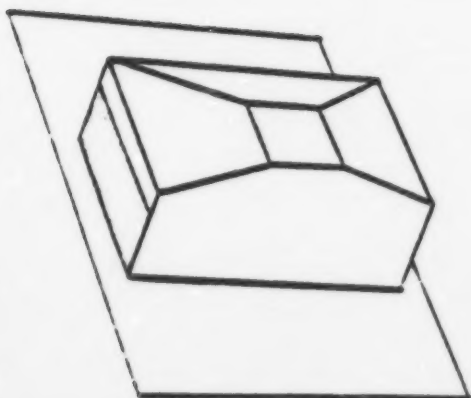
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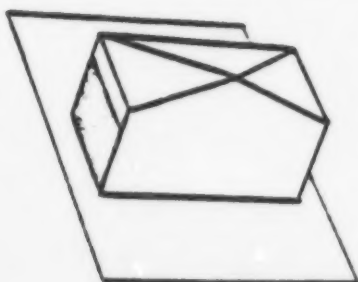
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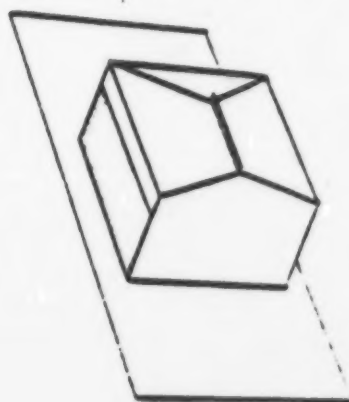
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A



B



C

variants

ATTACHMENT 1

CONSTRUCTION OF A SOLAR ENVELOPE OF DEVELOPABLE SPACE

Draw the Zoning Envelope

1. Mark all setbacks applicable to a lot under the appropriate zoning provisions (In the case of zones R3, R4 and R5, the front setback is required to be 6.00m, the sides 1.22m each and the rear setback to the main building is the lesser of 25% of the area of the lot or 7.60m of the depth).
2. Project the setback planes vertically to meet a horizontal plane at a height specified as the ceiling of development for the zone in question. (In the case of R3, R4 and R5 this height is 10.70m while for some commercial zones adjacent to residential, the height may be up to 13.80m).

Modify for Solar Access Protection

3. Locate the Base Line for the above protection as a line 1.31m below the ceiling of development and run it along all the setback planes.
4. Draw horizontal lines extending east and west from the midline of the lot to meet the Base Line.
5. Draw a plane to form an angle of 12° with the horizontal at the Base Line on the east side and extend it upwards to meet the ceiling plane. Repeat for the west side.
6. Draw a horizontal line extending north from the midline of the lot to meet the Base Line.
7. Draw a plane to form an angle of 12° with the horizontal at the Base Line on the north side and extend it upwards to meet the ceiling plane.
8. Extend the setback plane on the south side vertically above the Base Line to meet the ceiling plane. This will complete the construction of the Solar Envelope of Developable Space.

Variants of the Solar Envelope

- A. Zoning Envelopes which measure more than 12.20m from east to west side and more than 6.10m from north to south will produce a Solar Envelope chamfered on three sides (See Variant A).
- B. Zoning Envelopes which measure exactly 12.20m from east to west side will produce a ridge running north-south. If the dimension from north to south is exactly 6.10m the ridge will be reduced to a point and from the apex of the Solar Envelope (See Variant B)
- C. Lesser dimensions than the above, in each of the corresponding directions will produce ridges at heights below the ceiling of development. This difference in height may be utilized for the installation of solar collectors along a ridge, in the form of skylights for example (See Variant C)

ANALYSIS OF TEST RESULTS

Evaluation of SOLAR WINDOW and SOLAR ENVELOPE concepts for solar access protection.

As shown in Table 1, the evaluation of the above two concepts was carried out on the basis of 8 criteria numbered A.1 to A.5 and B.6 to B.8.

A.1 What is the percentage of unobstructed skydome on the Solar Window?

A total of 66 homes were surveyed (35 in Capital Ward and 31 in Westboro) but in only 33 of them were second floor windows to be found on the East-facing wall. In Capital Ward, the average proportion of unobstructed skydome was 48.2% while in Westboro it was 45.5%.

South-facing windows in Capital Ward had an average of 43.5% unobstructed skydome, while in Westboro, this average was 41.9%. West-facing windows had the poorest proportion of unobstructed skydome with an average of 43.1% in Capital Ward and only 36.1% in Westboro.

If the two areas are considered together, East-facing windows come out best, with an average of 46.4% of their skydome being unobstructed. It is the majority of South-facing windows however, that have part of their skydome unobstructed with an average proportion of 42.9%.

In conclusion, the Solar Window concept could be applied with only 40% to 45% of the skydome being unobstructed. On the south side, about 3 out of 4 windows could meet this criterion, but on the east and west sides, only 1 out of 2 would do so.

A.2/3/4 Solar access protection would be possible for depths up to 5.00 m

In Capital Ward, East- and West-facing walls could have a depth of 5.00 m protected in 28.6% to 34.3% of the homes surveyed. In the case of South-facing walls, the number of homes would be over 77%. East- and West-facing walls which could have a depth of 5.00m protected, but on the South-facing walls, this depth could be protected on 45.2% of the homes. The difference between the two areas is to be explained by the dominant direction of streets in each case.

Depths of 3.00m and 1.50m could be protected in progressively higher percentages of homes, but the basic difference between the two areas persisted.

It is therefore concluded that a depth of 3.00m could be protected on East and West-facing walls in the majority of existing homes located in Capital Ward and Westboro. Heliodon tests indicated that even if all homes were fully developed to reach their ultimate development envelope, as defined in Attachment 1, a strip of 0.60m would still be available for solar access protection. On South-facing walls, a depth of 5.00m could be protected in over 77% of homes in Capital Ward, but due to adverse orientation of existing homes in Westboro, only about 45% could be given such protection.

A.5 Solar access protection would be possible for 10% of the lot area on this side

Over 77% of Capital Ward homes could have a Protected Garden on the south side and enjoy at least 6 hours of sunshine on December 21st. By reason of adverse orientation however, only 45.2% of Westboro homes could enjoy the same privilege. Transfer of the Protected Garden to the east or west side of the house would allow about 70% of Westboro homes to have this amenity, but only for 3 hours on December 21st. Accordingly, Westboro property owners might prefer to transfer part of their Protected Garden on the east and part of it on the west side of their lot, to enjoy a total of 6 hours sunshine.

B.6 Extension of a neighbouring home would be possible on this side

The high density in Capital Ward makes such extensions difficult on the east or west side of a subject property. On the south side, nearly 63% of the properties would not have their solar access disturbed by a neighbour's extension.

By virtue of existing orientation of Westboro homes, only 38.7% of them would maintain current solar access levels, if a southerly neighbour extended his house. East or West side tolerance for extensions on the other hand, would amount to 67.8% and 61.9% respectively.

B.7 The design of an extension to a neighbouring home would be easy

An 'easy' extension was defined as one which would be contained within horizontal and vertical planes and have a roof built with standard trusses. Conversely, an 'imaginative design' might involve inclined planes and an unusual roof shape, in order to maintain a neighbour's solar access.

On this basis, the high residential density of Capital Ward would make nearly 46% of extensions to neighbouring homes on the south side quite simple to design and an additional 17% would require an imaginative design, giving a total of nearly 63%. A similar level of tolerance is to be found on the east and west side of subject properties in Westboro, but on the south side, only 22.6% would be easy to design and an additional 16.1% would require an imaginative approach.

B.8 Development beyond neighbouring lots would be possible on this side

This final criterion was very heavily influenced by the extent of existing built-up areas around the subject properties, rather than by considerations of solar access protection.

The average for both areas shows that 50% to 53% of the properties surveyed would allow development beyond neighbouring homes to occur. In Capital Ward development of this type would be on the southward side of 65.7% of the cases surveyed. By contrast, development was more feasible on the east and west of the subject properties in Westboro, than on the south.

Table 1: EVALUATION OF TWO SOLAR ACCESS PROTECTION CONCEPTS

- NOTES:
- (40+) means the majority of windows on this side have more than 40% unobstructed skydome.
 - 11/35 means only 11 out of a total of 35 properties had windows or windows with an unobstructed skydome. All other figures on the Table represent percentages.
 - 64.8 means that 6% of the extensions would have to be designed imaginatively. In order to protect solar access.
 - The sample of 66 homes allows a level of 95% confidence on these results.

EVALUATION CRITERIA	CAPITAL WARD		WESTBORD		CAPITAL AND WESTBORD	
	Standing in sample lot & looking: East	South	West	Standing in sample lot & looking: East	South	West
A. RELATED TO SAMPLE LOT						
1. Percentage of unobstructed skydome in Solar Window	48.2 (50.0) 11/35	43.5 (40.0) 30/35	43.1 (40+) 13/35	45.5 (40+) 22/31	41.9 (40+) 18/31	36.1 (40+) 23/31
2. Solar access protection would be possible for a depth of 5.00 m below soffit level	34.3	77.1	28.6	77.4	45.2	74.2
3. Ditto, 3.00 m depth	57.1	88.6	58.1	83.9	67.8	83.9
4. Ditto, 1.5 m depth	74.3	88.6	71.4	83.9	67.8	83.9
5. Is protection of 10% of lot area possible on this side?	34.3	77.1	35.5	74.2	45.2	67.8
B. RELATED TO SURROUNDINGS						
6. Extension of a neighbouring home on this side would be possible	22.8	62.9	28.6	67.8	38.7	67.9
7. Design of an extension to a neighbouring home would be easy	20.0 2.8	45.9 17.0	22.8 5.8	64.8 3.0	22.6 16.1	64.5 3.4
8. Development beyond neighbouring lots is possible on this side	34.3	65.7	34.3	70.1	38.7	67.8
				51.5	53.0	50.0
				43.9	51.9	43.9
				42.4 1.5	35.3 16.6	42.4 1.5
				57.6	62.1	48.5
				69.7	78.8	66.7
				78.8	78.8	77.3
				57.6	62.1	48.5

CONCLUSION

The evaluation of the two concepts indicates that the Solar Window could not be applied in densely-built areas like Capital Ward and Westboro, unless an unobstructed skydome of only 40%-45% were acceptable. The Solar Envelope on the other hand, appears to suit the density of these two areas quite well, allowing extensions to neighbouring homes, though a fair proportion of them would have to be carefully designed to protect solar access. The problems connected with the protection of solar access to part of a lot, could easily be resolved through registered transfer of such protection.

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COMMUNITY DEVELOPMENT
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OTTAWA

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ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

PUBLIC MEETING ON SOLAR ACCESS PROTECTION ON APRIL 29, 1982

(Organized by SESCOI and the City)

REPORT

In her opening address Linda Newell (SESCI) mentioned the wide range of opportunities that the use of solar energy opened for householders and stressed the need for protecting solar access to encourage people to invest in these opportunities.

The role of the Province was described by Jane Allen (Ministry of Energy) as providing moral and financial encouragement to municipalities in the promotion of energy conservation. She thought that current legislation provided a considerable basis for solar access protection through site plan control, official plan policies, zoning and zoning variances. A 'HANDBOOK FOR PLANNERS ON SOLAR ZONING' was due to be issued by the end of this summer by the Ministry of Energy.

Carol Christensen (RMOC) emphasized the division of powers within a region and advocated that the principles on which the Eastern Urban Community had been planned, be extended over existing urban areas. She also thought that some trade-off could be established between solar access (which could save up to 60% of heating costs) and semi-detached dwellings (up to 20%). Her advice to consumers was to tell builders their preferences in solar orientation and energy efficiency and they would no doubt get the message.

The review of solar access protection concepts adopted by various USA cities - given by Michael Weinstein (Consultant) - included solar easement and recordation. He advocated that four parties be borne in mind in drafting any piece of legislation on solar access: - the Proprietor, the Neighbour, the City and the Industry.*

A legal perspective to solar zoning was provided by Paul Webber (Barrister) who considered zoning as a device to impose restrictions on a home, which naturally was viewed by the citizen as his castle. His conclusion was that while solar access protection might work in new subdivisions where people had the opportunity to consider all restrictions before they moved into a neighbourhood, in the case of existing built-up areas, he considered that some other options - particularly the certification process - deserved further study.

*Note: These could be referred to at the monitoring stage of this project.

A brief program report on solar access protection in the City of Ottawa was given by Gary Armen (Senior Energy Planner) with an emphasis on the need for citizen participation in drafting a by-law for application to already built-up areas. He described the "networking" method of participation that had been adopted by the committees set up for Westboro and Capital Ward. This method consisted in each committee member carrying out a local study on some aspect of the by-law, preparing recommendations, persuading his colleagues and finally drafting the appropriate paragraphs of the by-law. Should all these paragraphs, as presented in the distributed Progress Report, gain public acceptance at this meeting, the subsequent step would be to pass them to the City's Legal Department for the final wording to be provided in readiness for consideration by the Council.

Two members of the committees - Jocelyn Eastland (Capital Ward) and Peter Fitzgerald - (Westboro) described the concepts underlying the proposals. Jocelyn emphasized the need for elaborating the Solar Window concept and continue the examination of other promising concepts. Peter thought that the Solar Envelope concept was quite promising, because hardly any new restrictions had to be imposed beyond what current zoning required. He challenged Mr. Webber to find any principle or procedure (in the Progress Report) which he considered unworkable. As a pioneer in home renovation with passive solar features, Peter expected the City and the Law to protect citizens who had invested in "solar".

The Panel Discussion in response to questions from the public dealt with the following matters:

- The Solar Window concept
- Shading control
- Notification procedure for proposed developments casting shadows
- USA legislation on solar access
- Solar collectors
- Trees and ways to control them
- Certification process
- Official Plan policies on conservation
- Validity of current planning law for solar access protection

CONCLUSION

The meeting served an educational purpose and established beyond doubt that the people attending were truly interested in solar access protection. In view of the broad range of subjects covered by the questions however, it would be advisable to hold a public meeting after distributing the proposal to every household (in say, Westboro) and ask for specific comments.



CIRCULATION AND APPROVAL OF THE MODEL BY-LAW

The draft provisions worked out by Westboro Solar Access Committee underwent a number of modifications before becoming embodied as a model by-law and this section provides a brief account of this procedure. The steps following the preliminary formulation and discussion with technical experts were as follows:-

1. Public opinion surveys and awareness campaign on solar access in Westboro.
2. Discussion with various departments within City Hall.
3. Comments by technical agencies within the City of Ottawa and the Regional Municipality.
4. Suggestions from community leaders, Ministries, organizations and experts in Ontario.

Beyond this continually widening circle of consultations, there were also opportunities to present this work at conferences on urban planning. In this section, it is proposed to summarize the constructive comment received on all these occasions and correspondence, in order to provide a complete account of the process of forging the Model Solar Access By-law before its presentation to Ottawa City Council.

PUBLIC OPINION SURVEYS AND
PUBLIC AWARENESS CAMPAIGN
ON SOLAR ACCESS PROTECTION

The public meeting with experts on solar access on April 29, 1982, (as reported in the preceding section of this report) provided a forum for the exposition of alternative concepts of protection in built up areas and inspired sufficient confidence to members of the Westboro Committee, as to make them dare present their proposal to the community at large.

The first stage was to carry out a public opinion survey, but due to the complexity of the subject of solar access protection, it was considered essential to accompany this with a public information or public awareness campaign to educate the community on the subject. The Committee meeting of May 12, considered a draft questionnaire for the survey and the complexity of the problem became starkly evident. It was therefore decided to organize a two-stage survey of public opinion on the subject, as follows:-

1. A brief questionnaire to a large sample of residents, justifying a minimum of 95% confidence level on the results.
2. A more detailed questionnaire to at least 25% of the above sample, justifying a minimum of 86% level of confidence on the results.

It was also agreed that a campaign to raise public awareness on solar access matters should accompany each of these stages and a scenario was worked out as follows:-

SCENARIO FOR THE PUBLIC AWARENESS CAMPAIGN ON SOLAR ACCESS PROTECTION

<u>Stage</u>	<u>Operation and Duration</u>	<u>Person(s) In Charge</u>
1	Contact all media in Westboro and the City with a press release and an offer for interviews or articles on the subject.	City Energy Planner (CEP) CEP and 2 members at interviews.
2	Distribute brief questionnaire to a large sample of points on a grid over Westboro. Give each household a profusely illustrated pamphlet on solar access stressing benefits and impacts. Leave contact telephone number and promise to collect in 2 days. (2 weeks)	Sample design: CEP Questionnaire distribution and collection: Committee and Community Resource assistance.
3	Analysis of response to brief questionnaire and review of steps 4 -8 .	
4	Mobile demonstration prepared during Stages 1 and 2 to be displayed at church basements, community centre and schools (1 week)	Preparation of exhibit: Committee representative, CEP, Technical Section.
5	Distribute detail questionnaire to at least 25% of large sample. Mobile Demonstration to be toured and stationed at sample points. Interviewers to call	Sample design: CEP Van/Truck: City Hall Interviews: Committee and Community Resources.

respondents at home,
 offering them
 explanation and
 exhibition of
 Principles of Solar
 Access Protection at
 Mobile Demonstration.
 (3 weeks)

6	Analysis of Questionnaires and formulation of conclusions. (1 week)	CEP and Committee
---	---	-------------------

7	Public Meeting at Westboro Community Centre to communicate results and confirm broad acceptance of Principles by community. (1 week)	Committee
---	--	-----------

Persons were appointed to approach various media in the National Capital and it was agreed that throughout this awareness programme of activities, the Committee would be referred to as THE WESTBORO SOLARIANS.



OTTAWA

ROBERT BAILEY
COMMISSAIRE-COMMISSAIRE

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111 PROMENADE SUSSEX

K1N 5A1

PROTECTION OF THE RIGHT TO SUNLIGHT

P R E S S R E L A S E

A preliminary survey with a brief questionnaire on 5 basic principles to be included in the proposed by-law on solar access protection for Westboro residents - one of three trial areas in the City, the others being Ottawa South and the Glebe - produced a very positive result. No fewer than 300 residents asked for additional information on the proposal, expressing their willingness to receive a more detailed questionnaire on the subject.

The detailed survey form on this second stage of the Public Opinion Survey on Solar Access Protection presents all the major decision options that the Committee of Westboro residents - WESTBORO SOLARIANS - had to resolve through discussions over the past 3 months. The aim is to take the interested residents through the entire process of sorting out individual and group preferences towards a system of fair rules on solar access - fair to the resident; to his neighbours; to the City and to the Province. The latter two tiers of government will have to pass the necessary legislation to ensure the right to sunlight in response to the residents' wishes. And according to a survey on Sunday June 20 at Major Hill Park, the wishes of Westboro residents on the subject are similar to those of Ottawans at large.

The Ontario Ministry of Municipal Affairs and Housing is financially sponsoring this project, to establish the process by which municipalities may protect solar access in already built-up areas. If the proposals put forward by the Westboro Solarians are acceptable to the community, a pioneering by-law on solar access will be created by Ottawa City Council.

The survey will be completed by June 30 and a public meeting to discuss the results will be held in Westboro Community Centre (411 Dovercourt) at 7:30 p.m. on July 8, 1982, under the chairmanship of Alderman T. Denison.

FOR FURTHER INFORMATION PLEASE CALL:

THE CITY ENERGY PLANNER: 563-3000

- 30 -

GA:sac-1

A38095

Minimum 6 hours sun on Dec 21

Bylaw "guarantees" sun



by Agnes MacIntosh

For the past several months the Westboro Solarians, a committee of interested residents formed to study various options for the legal protection of the right to sunlight on all properties in the area, have been meeting at the Westboro Community Centre. After establishing the maximum acceptable volume of development on a lot and calling it the "Solar Envelope", they have considered various provisions which should be covered in a by-law intended to protect the right to sunlight.

These provisions were explained in a form that was distributed to residents in the neighborhood by students of Nepean High School. It is hoped that those who received it took a few minutes to complete the questionnaire and express their opinion at this formative stage of an important by-law.

The "Solar Envelope" referred to earlier is established for any property by using the setback and height restrictions applicable to that property under the zoning provisions in AZ-64. The rectangular volume designated under the zoning by-

law is slightly modified by sloping the roof surfaces - an essential requirement for shedding snow and rain, in any case. This modification allows the maximum penetration of sunlight onto the following 'protected surfaces' of a neighboring property: a greenhouse, a large window or a solar collector placed on (A) the roof, (B) the south wall, (C) anywhere on the top meter of east or west walls, (D) on 10 percent of the lot area on the south side of the property.

These surfaces should receive at least six hours of sunlight on the shortest day of

the year (Dec 21) in most existing homes in Westboro. Provisions will be made in the by-law for the exceptions.

If you have any ideas to suggest, or any queries about the proposed principles for the protection of the right to sunlight for properties in Westboro, please do not hesitate to call any member of the Westboro Solarians.

Members are: P. Fitzgerald: 729-1266; D. Smiley: 722-6817; A. MacIntosh: 722-5338; F. Lambert: 722-5463; D. or B. Mackay: 722-5817; C. Jackson: 722-4090.

Security program set up in Glabar Park area

by Tarmon Hall

On June 16 a general meeting on Neighbourhood Watch and Home Security was hosted by Glabar Park Community Association at D Roy Kennedy School.

Constable Michael Tessier of the Ottawa Police Department provided a comprehensive slide show and demonstration of various locking devices. The response from the audience indicated a very effective presentation on his part.

Mr Rowney and Mr Pretty, on behalf of the association's security Committee, outlined

the proposed activities of block captains for the security program being initiated in the community. In areas represented by these captains, a direct means of communication will develop with the security committee. However, all areas in the community will receive pertinent information.

In conclusion, it was announced that an instructional meeting for block captains has been organized. As well, arrangements have been made with the police department for the provision of a mobile security display at strategic locations within Glabar Park.

Dr. Bryce
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The federal paying student maintenance community thious to be bus the capable y offering their charge to senic come families persons throug

Proposed "Right to Sunlight"

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been organized. As well, arrangements have been made with the police department for the provision of a mobile security display at strategic locations within Cilarbar Park.

ious to be busy and employed, the capable young people are offering their labor free of charge to senior citizens, low income families and handicapped persons throughout Ottawa.

odd jobs clients need accomplished.

A call to Steven Baker at 489-2409 will have a handyman (or girl) on the job quickly.

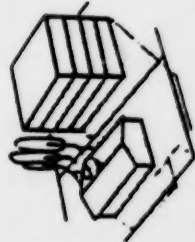
Proposed "Right to Sunlight" Provisions



City of Ottawa



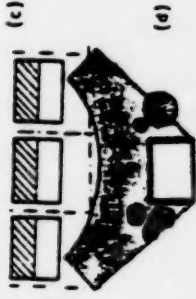
(a)



(b)

Land use zoning should be modified to ensure that any device which makes use of solar energy - eg. a greenhouse, large window or solar collector - receives at least 6 hours of sunshine on December 21st, if placed on any of the following "protected surfaces":

- The roof;
- The south wall;
- A 100 cm deep strip on the east and west walls;
- 10% of the lot area on the south side of the property, or any other feasible location selected by the owner.



(c)



(d)



(e)

Application for variance from these provisions must include a set of shade diagrams. These will be sent together with all necessary notification to the affected neighbours, to help them understand and, if need be, object to new construction affecting their existing solar access, at a public hearing.

A permit will be required to allow the installation of a greenhouse or other "solar collector" - ie. any passive or active device which can absorb and store solar energy - on an existing or new structure. This structure will be inspected for adequate structural stability for the proposed installation and a photographic record will be made of existing vegetation and structures in the vicinity, for future reference.

If a "solar collector" on a "protected surface" (as explained in (d) and (e) above) is overthrown more than 15% of its area, or longer than 1 hour between 9 a.m. and 3 p.m. on any day of the year, by newly planted or continuously growing vegetation, the owner of that collector can request the City to trim or prune back that vegetation.

Planned bylaw bright idea for sun-loving homeowners

By Dave Rogers
Citizen staff writer

Ottawa could become the first city in North America to guarantee owners of existing homes access to sunlight.

City planner Gary Armen said Ottawa planning board is expected to consider a bylaw later this summer which would restrict the type of trees homeowners could plant and limit building heights to protect access to sunlight.

The bylaw would ensure that homes with large windows, solar

collectors or greenhouses have a chance of receiving at least six hours of sunlight a day.

Existing buildings and trees would be unaffected, but new development would have to conform to the bylaw.

Under the proposed bylaw, Armen said, newly-planted evergreen trees that grow tall enough to cast shadows on solar collectors would have to be cut down or replaced by trees that shed their leaves in the fall.

The bylaw would require permits

for new greenhouses or solar panels to allow city inspectors to determine whether they were structurally sound and photograph surrounding trees and buildings.

The city would prune trees if solar panels or greenhouses are shaded more than 15 per cent of the day.

Anyone wanting to exceed the bylaw's height limit would have to submit shade diagrams to the city so neighbors could object.

Ald. Terry Denison predicted the proposed regulations would be con-

troversial, but added people who invest in solar heating panels should be protected.

Denison said the bylaw as proposed may be too rigid, but a more flexible approach might be acceptable.

"The success of this depends on whether it is an absolute thing or if there is some compromise," he said. "These guidelines would prevent the planing of certain trees and the construction of high buildings. This could become an election issue."

A NEWSLETTER PUBLISHED BY LANDS DIRECTORATE, ENVIRONMENT CANADA



VOL. 3
NO. 2

1982

Here Comes the Sun

City planners in Ottawa are examining the issue of homeowners' right to solar access. The implementation of passive solar gain or the collection and storage of solar heat demands direct access to sunlight. Property owners who install solar windows, panels or other special equipment naturally seek the assurance that their investments will not be lost to new construction in the neighbourhood. Currently, some protection of solar access is provided by zoning by-laws, which restrict building heights and determine setbacks from property lines.

In January 1982, local advisory commit-

tees, funded by an Energy Conservation Through Land-Use Planning grant from the Ontario Ministries of Energy and of Municipal Affairs and Housing, were set up in three trial communities of the city — Ottawa South, the Glebe and Westboro. The findings of the committees, whose objectives are "to balance the quality and extent of solar protection with restriction on development and the enhancement of the environment," will form the basis for a new solar access protection by-law.

Protection of solar rights is not an entirely new concept. Under English common law, the doctrine of ancient lights assured the

landowner that "Lights or windows in a house, which have been used in their present state, without molestation or interruption, for twenty years, or upwards" can not be "obstructed or closed by the owner of the adjoining land which they may overlook." A rapidly expanding Canada in the 19th century abolished the right as too restricting for development.

Although several U.S. cities have by-laws regarding solar rights, Ottawa will, if a solar protection by-law is passed, become the first Canadian city to guarantee solar access to homeowners.

was enacted as a result of a by-law proposal by Toronto City Council in the early 1970s, which would have required all commercial developments in the city to include a residential component. Since the Ontario Municipal Board argued that this plan was impracticable, the small lots policy was developed, allowing for the exchange of density rights on lots less than .4 hectares (one acre) in size, provided that the lots are situated within 150 metres (500 feet) of one another. Such an exchange, the department claims, assures a commercial/residential mix.

The first Toronto use of this concept was by Sun Life Assurance Company of Canada,

who paid \$3.75 million for the air rights of St. Andrew's Presbyterian Church, across King St. from Sun Life's head office development. The allowable commercial density of Sun Life's development was increased, and St. Andrew's gained substantially in cash assets while losing a right of negligible value to the church.

Sagur Investments' proposal, however, would involve sites which are not adjacent — perhaps not in the same district of the city. Sagur Investments' argument is an aesthetic/

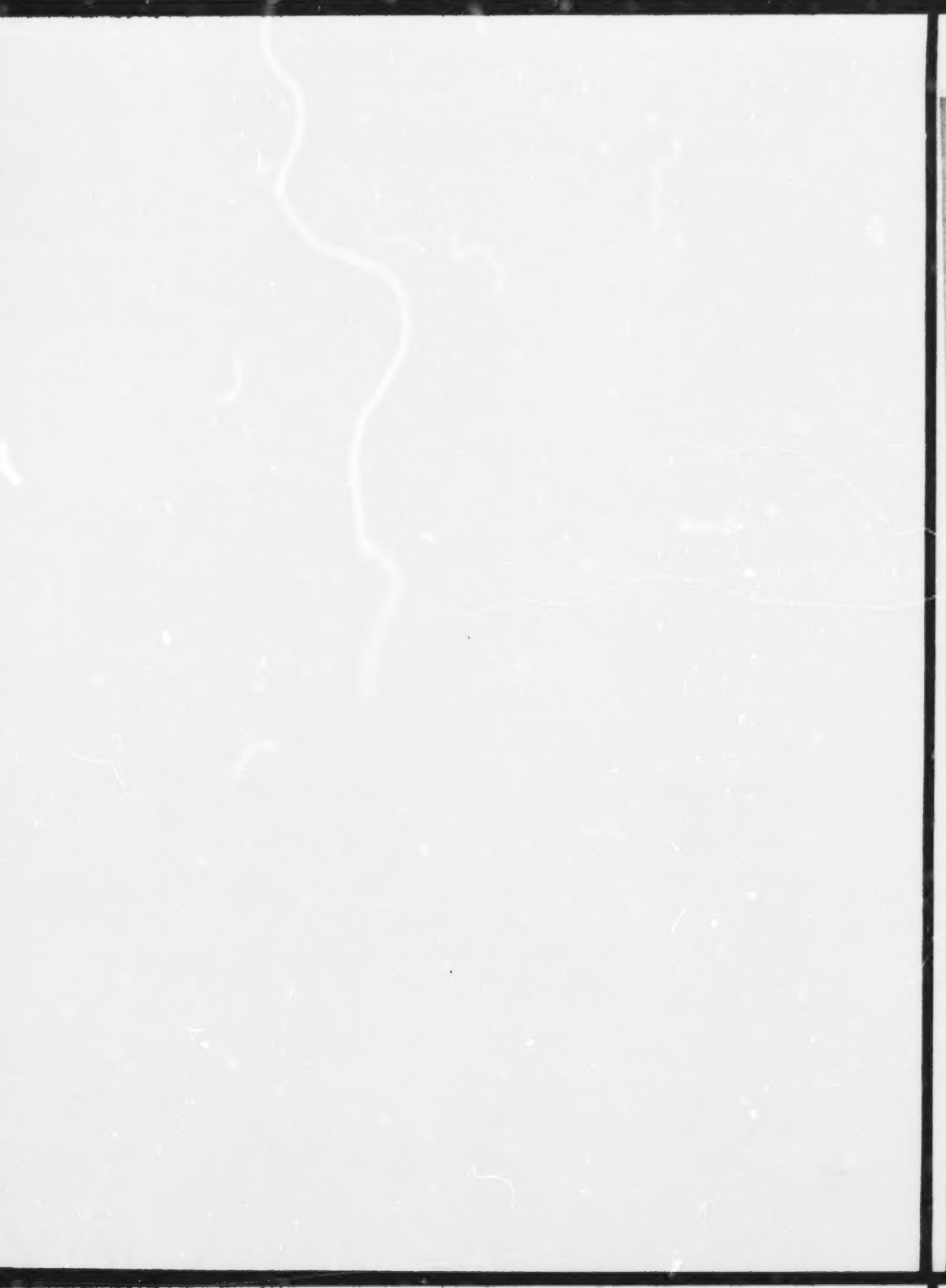
One of the common environmental themes that emerged at the 105th meeting of the United Nations Conference on Environment and Development in Nairobi, Kenya. Delegates from the 105 participating nations reaffirmed the broad commitment of the first conference, held in Stockholm in 1972, to maintain high priority of environmental considerations in modern economic development planning. Recognition was also given, however, to the fact that there is still a gulf between the theories and practices of global environmental protection. Many countries, over-burdened by economic or political difficulties, are unable to react attentively to environmental problems. Even the richer industrial nations of North America and Europe, who pressed eagerly for global action against pollution and resource depletion at the first Conference, are now finding themselves restrained by domestic problems such as inflation and unemployment.

A positive sign, however, is the increased enthusiasm for participation in conservation and anti-pollution activities among developing countries, who once feared that environ-

Newsletter Lands Award

Environment Canada's LAND/TERRE newsletter was recently honoured with

LAND received an Award of Excellence in the House Organ and Newsletter category.





OTTAWA

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

CITY HALL
111 SUSSEX DRIVE

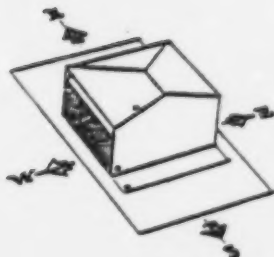
HÔTEL DE VILLE
111 PROMENADE SUSSEX

PUBLIC OPINION SURVEY ON THE PROTECTION OF THE RIGHT TO SUNLIGHT

Since January this year, a local committee of residents has been studying various options for the legal protection of the duration of sunshine on every property in Westboro. This committee has now drawn up a series of principles towards a by-law which are explained below. The committee - known as "Westboro Solarians" - would greatly appreciate receiving your views on these principles which represent a code of good behaviour between neighbours, to ensure the enjoyment of sunshine for all.

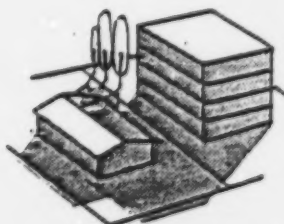
This study forms an integral part of the Westboro Neighbourhood Plan and it is therefore crucial that you express an opinion at this formative stage of a new by-law. The person that handed you this form will call to collect it in two days' time. Please complete it in time for this collection.

PROPOSED "RIGHT TO SUNLIGHT" PROVISIONS

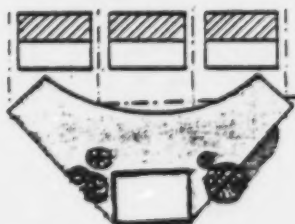


- (a) Land use zoning should be modified to ensure that any device which makes use of solar energy - eg. a greenhouse, large window or solar collector - receives at least 6 hours of sunshine on December 21st, if placed on any of the following "protected surfaces":

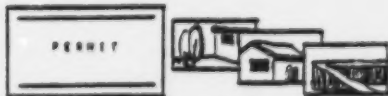
- A. The roof;
- B. The south wall;
- C. A 100 cm deep strip on the east and west walls;
- D. 10% of the lot area on the south side of the property, or any other feasible location selected by the owner.



- (b) Existing buildings, trees and hedges, including the shadows they cast at present, will be accepted as they now stand. All new construction and planting however, will be required to conform to these provisions.



- (c) Application for variance from these provisions must include a set of shade diagrams. These will be sent together with all necessary notification to the affected neighbours, to help them understand and, if need be, object to new construction affecting their existing solar access, at a public hearing.



- (d) A permit will be required to allow the installation of a greenhouse or other "solar collector" - ie. any passive or active device which can absorb and store solar energy - on an existing or new structure. This structure will be inspected for adequate structural stability for the proposed installation and a photographic record will be made of existing vegetation and structures in the vicinity, for future reference.



- (e) If a "solar collector" on a "protected surface" (as explained in (d) and (a) above) is overshadowed more than 15% of its area, or longer than 1 hour between 9 a.m. and 3 p.m. on any day of the year, by newly planted or continuously growing vegetation, the owner of that collector can request the City to trim or prune back that vegetation.

POSSIBLE IMPACTS OF A SOLAR ACCESS PROTECTION BY-LAW

- POSITIVE: - Every property owner will be guaranteed the use of solar energy in accordance with the provisions of the by-law;
- The urban environment will remain open, airy and high density development will be required to respect existing solar access to surrounding properties.

POSITIVE or NEGATIVE ACCORDING to OUTLOOK - Some delay in the development control process due to inspection, notification of neighbours and design amendments;

- Limitation of urban growth in Westboro may limit population growth;

- Buildings which do not at present conform with zoning by-laws, if destroyed, may not be allowed to be replaced to the same height, bulk and density.

NEGATIVE: - Limitation on the height and volume of extension(s) to a property;

- Limitation on the species of trees and hedges to be planted on a lot - e.g. deciduous rather than evergreen species.

QUESTIONS

1. In view of the possible impacts of a Solar Access Protection by-law, are you in favour, or against the principle of protecting access to the sun? (Please check)

IN FAVOUR ☐

AGAINST ☐

I AM UNABLE TO DECIDE AT PRESENT ☐

2. If you are in favour of the principle, do you feel that the provisions (a) to (e) worked out by the committee -

ARE ACCEPTABLE ☐

ARE NOT ACCEPTABLE ☐

I WOULD LIKE TO PROPOSE OTHER IDEAS ☐

(Please describe them and indicate your telephone number here:)

I AM UNABLE TO DECIDE AT PRESENT ☐

3. Would you like more information and a more detailed survey form?

YES, I WOULD ☐

NO, I AM NOT INTERESTED ☐

MY ADDRESS IS:

For queries on this form, please call THE CITY ENERGY PLANNER: 563-3000 or any member of THE WESTBORO SOLARIANS:

(evenings)

(daytime)

P. Fitzgerald: 729-1266
A. MacIntosh: 722-5338
D. or B. MacKay: 722-5817

D. Smiley: 722-8617
F. Lambert: 722-5463
C. Jackson: 722-4090



CITY OF OTTAWA
COMMUNITY DEVELOPMENT
DEVELOPMENT COMMISSION

OTTAWA

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

WESTBORO SOLARIANS
IN CO-OPERATION WITH THE CITY OF OTTAWA

PUBLIC OPINION SURVEY
ON THE PROTECTION OF THE RIGHT TO SUNLIGHT

I called to collect the completed questionnaire with your opinion on the right to sunlight. Unfortunately, you were not available.

YOUR OPINION MATTERS

Would you please send the completed questionnaire as soon as possible by mail, addressing it to:

THE CITY ENERGY PLANNER
CITY HALL
111 SUSSEX DRIVE
OTTAWA, ONTARIO
K1N 5A1

Otherwise please call him at: 563-3000

Thank you for taking the time to make your opinion count.

Distribution and collection by:

The Nepean High School Water Polo Team
(Champions in Girls Competition for 3 years, and in Boys Competition for 2 years)



OTTAWA

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

CITY HALL
111 RUSSELL DRIVE

HOTEL DE VILLE
111, PROMENADE RUSSEL

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PUBLIC OPINION SURVEY ON THE PROTECTION ON THE RIGHT TO SUNLIGHT

Stage II

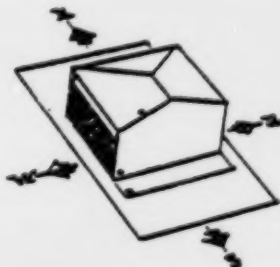
The results of the preliminary survey on the proposed 'right to sunlight' provisions indicated that the majority of residents in Westboro were in favour of the principle of protecting this right through a suitable by-law. About 300 residents asked for more information and the purpose of this stage of the survey is to present to you the options that confronted the committee - THE WESTBORO SOLARIANS - in drafting provisions (a) to (e) below for the proposed by-law.

Your opinion will greatly affect the final provisions for the proposed by-law on the right to sunlight and we hope you will take the time to respond as soon as possible. The person that handed you this form will call to collect it in three days' time. Please complete it in time for this collection.

OPTIONS IN DRAFTING EACH PROVISION

ON THE RIGHT TO SUNLIGHT

Provision (a)



Land use zoning should be modified to ensure that any device which makes use of solar energy - eg. a greenhouse, large window or solar collector - receives at least 6 hours of sunshine on December 21st, if placed on any of the following "protected surfaces":

- A. The roof;
- B. The south wall;
- C. A 100 cm deep strip on the east and west walls;
- D. 10% of the lot area on the south side of the property, or any other feasible location selected by the owner.

OPTIONS:

1. Roof (A) and south wall (B) are the most useful surfaces to protect, but the lower the surface protected on a house, the more restricted the volume of extension(s) to neighbouring homes.

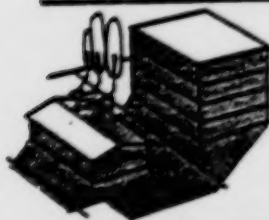
QUESTION: Are you in favour or against protecting solar access to:
(Please Check ✓)

	In Favour	Against
- The entire south wall	☐	☐
- Only 2nd- & 3rd-storey part of south wall	☐	☐
- Only 3rd-storey part of south wall	☐	☐
- I don't know	☐	

2. The 100 cm deep strip (C) on east and west walls is automatically protected by virtue of side setbacks in every lot. The 10% of the lot area (D) or 'protected garden' however, may restrict extension(s) on neighbouring lots and it may be transferred to any feasible location selected by the owner.

QUESTION: Are you in favour or against protecting solar access to:

	<u>In Favour</u>	<u>Against</u>
- Any part of the lot area	☐	☐
- Only 10% of lot area (as proposed)	☐	☐
- A higher percentage of the lot area (Please indicate your preference here)		
- Allowing transfer of the 'protected garden' from the south side	☐	☐
- I don't know	☐	



Provision (b)

Existing buildings, trees and hedges, including the shadows they cast at present, will be accepted as they now stand. All new construction and planting however, will be required to conform to these provisions.

1. Each of the elements in this provision could be casting an undesirable shadow at present.

QUESTION: Are you in favour or against accepting each of the following as they now stand?

	<u>In Favour</u>	<u>Against</u>
- Existing Buildings	☐	☐
- Existing Trees	☐	☐
- Existing Hedges	☐	☐
- I don't know	☐	

2. New construction to replace an existing structure which casts an undesirable shadow may or may not conform to the proposed by-law. The option is yours to indicate below:

QUESTION: If any structure casting an undesirable shadow were destroyed, would you be in favour or against its being replaced 'as it stood'?

	<u>In Favour</u>	<u>Against</u>
- Replacement 'as it stood'	☐	☐
- Replacement in conformity with proposed by-law	☐	☐
- I don't know	☐	

3. Destruction may be willful or due to natural causes.

QUESTION: Would you be in favour or against allowing replacement of a structure 'as it stood', if it were damaged:

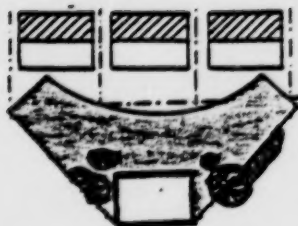
	<u>In Favour</u>	<u>Against</u>
- Willfully	☐	☐
- By natural cause	☐	☐
- By either of the above	☐	☐
- I don't know	☐	

THE "DETAIL QUESTIONNAIRE" SURVEY

The preparation of this questionnaire was carried out through several drafts and the final outcome is shown overleaf. It was distributed through the services of a smaller team of students and collected in three days' time by the students, in person. The note left by students in case no household member was available is shown in reduced form below. It should be noted that it also served as an invitation to the public meeting on the results of the opinion surveys, which are shown in the pages following the detailed questionnaire. A summary of all comment received through the public opinion surveys is given in Appendix 4. (IDEAS ON SLAR ACCESS AS CONTRIBUTED BY WESTBORO RESIDENTS).

PUBLIC MEETING ON THE RESULTS OF THE OPINION SURVEYS

This was convened at Westboro Community Centre on July 8, 1982 and although the adjacent poster was delivered to 500 households in addition to the 300 who had opted to ask for the detail questionnaire, yet only about 20 people attended. NEWSWEST, the Westboro monthly, appeared only by mid-month and a specially written feature article and advertisement on the following pages could not reach the public on time. Nevertheless, the meeting was quite lively, with the Westboro Solarians putting forward all the arguments in favour of solar access, while an employee of Energy Mines and Resources (a most unlikely source) was the sole but vociferous opposition (!) and Alderman Terry Denison,



Provision (c)

Application for variance from these provisions must include a set of shade diagrams. These will be sent together with all necessary notification to the affected neighbours, to help them understand and, if need be, object to new construction affecting their existing solar access, at a public hearing.

OPTIONS:

1. Any developer may build to the maximum height permitted by current zoning for a lot, provided that any shadows cast by his development do not: -
 - (i) Stay longer than 1 hour between 9 a.m. and 3 p.m. on a "protected surface" (A, B, C, D, as indicated in Provision (a)) on December 21; or -
 - (ii) Obscure more than 15% of the area of a "protected surface" on December 21.

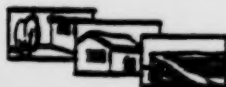
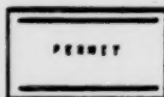
QUESTION: Are you in favour or against the permissible obstruction of sunlight due to a proposed development, being:

	<u>In Favour</u>	<u>Against</u>
- Up to 1 hour in 6 (as proposed)	☐	☐
- Longer than 1 hour in 6 (Please indicate your preference here):	HRS.	
- Not more than 15% of the area of a protected surface (as proposed)	☐	☐
- More than 15% of the area (Please indicate your preference here):		
- I don't know	☐	

QUESTION: Are you in favour or against the principle of sending notification to neighbours likely to be affected by the shadows due to a proposed development?

	<u>In Favour</u>	<u>Against</u>
- Send notification	☐	☐
- I don't know	☐	

Provision (d)



A permit will be required to allow the installation of a greenhouse or other "solar collector" - i.e. any passive or active device with a surface of at least 3,600 sq. cms capable of absorbing and storing solar energy - on an existing or new structure. This structure will be inspected for adequate structural stability for the proposed installation and a photographic record will be made of existing vegetation and structures in the vicinity, for future reference.

QUESTION: Are you in favour or against:

	<u>In Favour</u>	<u>Against</u>
- Requiring a permit for 'solar collector' installations (as defined above).	☐	☐
- Inspecting the structure before installation.	☐	☐

	<u>In Favour</u>	<u>Against</u>
- Making a photographic record of vegetation and structures in the vicinity of an installation	☐	☐
- I don't know	☐	

Provision (e)

If a "solar collector" on a "protected surface" (as explained in (d) and (a) above) is overshadowed more than 15% of its area, or longer than 1 hour between 9 a.m. and 3 p.m. on any day of the year, by newly planted or continuously growing vegetation, the owner of that collector can request the City to trim or prune back that vegetation.

QUESTION: Are you in favour or against:

	<u>In Favour</u>	<u>Against</u>
- The principle of interfering with vegetation.	☐	☒
- Leaving matters to the neighbours to sort out, if need be, by going to court on vegetation matters.	☐	☒
- Making the City responsible for taking action to enforce the law.	☐	☐
- Charging both owners (of the vegetation and of the solar collector) with the expenses on the first trespass.	☐	☐
- Charging only the owner of the vegetation on all subsequent trespasses to provide incentive for complete removal of the vegetation.	☐	☐
- Selecting tree species from a recommended list for future planting, to avoid problems.	☐	☐
- I don't know	☐	

I WOULD LIKE TO PROPOSE OTHER IDEAS (Describe them briefly. Your tel. no.)

Thank you for your co-operation. A visual display of these provisions will be touring Westboro. If you would like to see it, please call: THE CITY ENERGY PLANNER: 563-3000 or any member of THE WESTBORO SOLARIANS.

(Evenings)

P. Fitzgerald: 729-1266
A. Macintosh: 722-5338
D. or B. MacKay: 722-5817

(Daytime)

D. Smiley: 722-8617
F. Lambert: 722-5463
C. Jackson: 722-4090



OTTAWA

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

WESTBORO SOLARIANS IN CO-OPERATION WITH THE CITY OF OTTAWA

PUBLIC OPINION SURVEY ON THE PROTECTION OF THE RIGHT TO SUNLIGHT

I called to collect the completed questionnaire with your opinion on the right to sunlight. Unfortunately, you were not available.

YOUR OPINION MATTERS

Would you please send the completed questionnaire as soon as possible by mail, addressing it to:

THE CITY ENERGY PLANNER
CITY HALL
111 SUSSEX DRIVE
OTTAWA, ONTARIO
K1N 5A1

Otherwise please call him at: 563-3000

Thank you for taking the time to make your opinion count.

COME TO THE PUBLIC MEETING ON THE RESULTS OF THIS SURVEY

ON THURSDAY, JULY 8th, 1982, AT 7.30 PM
WESTBORO COMMUNITY CENTRE
411 DOVERCOURT

Ottawa homeowners make sunshine plans

By Christina Spencer

Citizen staff writer

Into every life, a little sun must shine.

That's the philosophy of a group of Ottawa residents drafting a by-law to keep property owners out of the shadow of new buildings and trees on their neighbors' land.

Aided by city officials, the group — dubbed the *Westboro Solarians* — has drafted a series of proposals to guarantee sunlight rights in their neighborhood.

If accepted by city council, the proposals will also take effect in Overbrook and the Glebe. City officials will then assess their practicality before applying them to the rest of Ottawa.

The city has no bylaw guaranteeing access to sunlight.

Gary Armen, Ottawa's senior energy planner, told a handful of residents at a public meeting Thursday the bylaw has been sought because sunlight plays a fundamental role in human life.

"The love of light is almost ingrained in our nature, and sunlight would serve energy needs. We're also coming to a point in industry and population growth where (buildings) either go high and dense or we keep the particular character of Ottawa by a special effort such as this."

The bylaw proposed would use zoning changes to guarantee the following:

- Any device (such as a solar collector, a large window or a greenhouse) that uses solar energy be guaranteed at least six hours of unblocked sunlight, even on the shortest day of the year. In order to be protected by this section of the bylaw, the solar collector would have to be either on the roof of a building, a south wall, a small band on the east or west wall, or a designated area on the south side of the property.

- Existing buildings and trees, even if they contravene this rule, wouldn't need to be altered. The bylaw would apply only to new construction or planting.

- For new buildings that do block sunlight on neighboring lands, the builder must give the city a set of 'shade diagrams,' showing where shadows would fall on adjacent property. Neighboring property owners would then have the right to object at a public hearing.

- A permit would be required for installation of any solar collector on an existing or new structure.

- If the solar-collector is in shadow on more than 15 per cent of its area for longer than one hour between 9 a.m. and 3 p.m. on any day of the year because of growing trees, the property owner could request the city to trim or prune the offending vegetation.

Earlier this year, a two-page questionnaire on solar access was sent to 1,200 Ottawa homeowners. Armen said of 586 responses, 76.5 per cent favored the proposals.

But the discussion of sunlight at Thursday's meeting did get a little heated.

Charles Ficner, an employee of the federal department of energy, mines and resources who deals in building and urban policy, said his work often brings him into contact with studies on solar energy.

"Your basic premise is that solar energy is good and will become more popular. But the studies are showing that so far only 10-20 per cent of the energy in a home comes from solar sources. It's an option that's just not cost-effective."

Solarian president Paul Fitzgerald, who owns a solar home, disagreed: "We're doing this just so it doesn't foreclose on our options to go toward solar energy in the future."

"Who's going to be hurt by it — except some developer who wants a 76-storey building?"

Article in The Citizen
(9.7.82)



OTTAWA

CITY HALL
111 SUSSEX DRIVE

HOTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

ROBERT SILEY
COMMISSIONER-COMMISSAIRE

THE RIGHT TO SUNLIGHT

IN WESTBORO

1. THE WESTBORO SOLARIANS

The Westboro Committee on Solar Access Protection - THE WESTBORO SOLARIANS - is a group of volunteers interested in the idea of protecting the 'right to sunlight' for every property in Westboro. The group was formed on January 28, 1982 at a public meeting on the subject of solar access protection organized by the Community Development Department of the City of Ottawa. Working on the principle of 'networking', whereby each member was able to undertake research on a particular aspect of protection - e.g. how trees interfere with solar access and how could they be dealt with - The Solarians came to propose Provisions (a) to (e) shown on Appendix 1.

On April 28, 1982, at a public meeting with legal and other experts assembled at the Glebe Community Centre by the Solar Energy Society of Canada Inc. and the City of Ottawa, the group received favourable comment on these Provisions and decided to present them to the residents of Westboro.

2. THE OPINION SURVEYS

This presentation took the form of a public awareness campaign on the right to sunlight, involving publicity on television and newspapers, a visual display and two opinion surveys.

The first opinion survey consisted of a two-page questionnaire which was distributed to 1,200 households. It stated Provisions (a) to (e), informed residents about the possible impacts of a solar access protection by-law and posed three questions. The first asked whether the respondent was in favour or against the principle of protecting access to the sun. An overwhelming majority of households (85.9%) expressed themselves in favour of this principle with only 5.9% being against and 8.2% being undecided. The second question asked whether the respondent felt that the Provisions worked out by THE SOLARIANS were acceptable and agreement was expressed by 76.5% of the respondents. Some valuable ideas were proposed by 15.3% of the households and these will be discussed at the Public Meeting with a view to incorporating them in the Provisions, if acceptable to the public at large. Finally, the third question asked whether the respondent would like information and a more detailed survey form on the right to sunlight. About 300 residents expressed this interest and they were sent the second survey form.

The second survey presented the respondents with all the options that confronted THE SOLARIANS in drafting the Provisions for the proposed by-law on solar access protection.

The results of the detail survey may be divided into three categories as follows:

A. Overwhelming approval (over 60% of the vote) in favour of the following propositions:

1. Protecting solar access for the roof, south wall, 100 cm deep strips on the east and west walls of a property and on 10% of the lot; (78.6% of respondents were in favour).
2. Accepting existing buildings (92.9%), existing trees (85.7%) and existing hedges (92.3%), as they now stand, including the shadows they cast at present.

3. Allowing replacement of a structure 'as it stood' if destruction was due to a natural cause (90.0%). If destruction was deliberate, only 60% of the respondents would allow such replacement.
 4. Permissible obstruction of sunlight due to a proposed development being up to 1 hour in 6 (response: 81.8% in favour) and not more than 15% of the area of a protected surface - see 1 above - (100.0% in favour).
 5. Sending notification to neighbours likely to be affected by the shadows due to a proposed development (87.5%).
 6. The principle of interfering with new vegetation to protect solar access (61.5%).
 7. Making the City responsible for taking action to enforce the law on solar access as regards vegetation (71.4%).
 8. Charging the owner of the vegetation on all trespasses to provide incentive for complete removal (60.9%).
 9. Selecting tree species from a recommended list for future planting, to avoid problems (71.4%).
- B. Slight majorities, near-ties or slight minorities of opinion were expressed in the case two options:-
1. Allowing transfer of the 'protected garden' (i.e. 10% of the lot area) from the south side of a property to any other feasible location selected by the owner. Applications for a transfer - according to the detail proposals of THE SOLARIANS, as presented to the experts on April 28, 1982 - has to be made to the City Energy Planner who will notify the neighbours and where necessary, introduce compromises before registering a transfer.
 2. Requiring a permit for solar collector installations, inspecting the structure and making a photographic record of vegetation and structures in the vicinity. Many respondents were against the need for a special permit for solar installations and yet quite a few accepted the necessity of structural inspection of existing structures before the installation. It is therefore proposed to wave the need for a special permit in the case of new construction, provided the applicant submits photographs giving a panoramic view around his site. Retrofitting a solar collector onto an existing structure however, will require a special permit and inspection.
- C. A majority against a proposal of THE SOLARIANS was recorded in the following case:
1. Charging both owners (of the vegetation and the solar collector) with the expenses of the first trespass by a vegetation casting an undesirable shadow. The vote was 90.0% against this proposition.
- THE SOLARIANS would welcome the simple alternative of charging only the owner of the vegetation, but they would like to explain the motivation behind their proposition. This will be discussed at the Public Meeting.

Mention must be made of the fear expressed by a number of respondents about the property tax and administrative implications of a solar access protection by-law. The intention of THE SOLARIANS, throughout their drafting of the provisions was that the fee to be charged for Protected Garden Transfers and Solar Collector Permits should be sufficient to cover all administrative costs in connection with the proposed by-law. This will automatically come to the attention of the Finance Department when the by-law report is circulated before submission to the Ottawa Planning Board and the Council for approval.

CONCLUSION

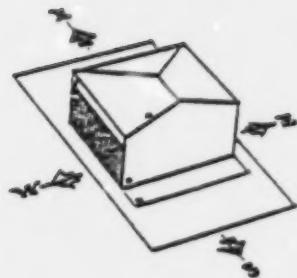
The principle and provisions of the proposed by-law on solar access protection, as put forward by THE WESTBORO SOLARIANS are broadly acceptable to the residents of the area. If enacted by City Council, this by-law will serve as a model for many other areas in the City, in which residents wish to have their 'right to sunlight' protected. Moreover, the sponsorship of the Ontario Ministry of Municipal Affairs and Housing as secured by City Council through a grant will ensure that the participatory process by which this by-law was drafted is recommended to all other municipalities in the Province, in which built-up areas cover the majority of the administrative area.

THE WESTBORO SOLARIANS have carried out a pioneering study for the City and the Province.

GA:cse-2
A2B053

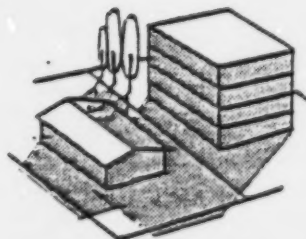
APPENDIX 1

PROPOSED "RIGHT TO SUNLIGHT" PROVISIONS

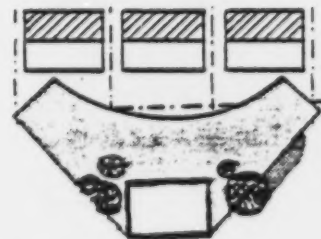


- (a) Land use zoning should be modified to ensure that any device which makes use of solar energy - eg. a greenhouse, large window or solar collector - receives at least 6 hours of sunshine on December 21st, if placed on any of the following "protected surfaces":

- A. The roof;
- B. The south wall;
- C. A 100 cm deep strip on the east and west walls;
- D. 10% of the lot area on the south side of the property, or any other feasible location selected by the owner.



- (b) Existing buildings, trees and hedges, including the shadows they cast at present, will be accepted as they now stand. All new construction and planting however, will be required to conform to these provisions.



- (c) Application for variance from these provisions must include a set of shade diagrams. These will be sent together with all necessary notification to the affected neighbours, to help them understand and, if need be, object to new construction affecting their existing solar access, at a public hearing.



- (d) A permit will be required to allow the installation of a greenhouse or other "solar collector" - ie. any passive or active device which can absorb and store solar energy - on an existing or new structure. This structure will be inspected for adequate structural stability for the proposed installation and a photographic record will be made of existing vegetation and structures in the vicinity, for future reference.



- (e) If a "solar collector" on a "protected surface" (as explained in (d) and (a) above) is overshadowed more than 15% of its area, or longer than 1 hour between 9 a.m. and 3 p.m. on any day of the year, by newly planted or continuously growing vegetation, the owner of that collector can request the City to trim or prune back that vegetation.



the Ward Alderman, acted as the fair arbiter. A very fair report of the proceedings appeared the following day in the Ottawa CITIZEN by Christina Spencer and it is reproduced in one of the following pages.

The most important outcome of the meeting was that one of the provisions put forward by the Committee which had met with 90% opposition in the Opinion Surveys was eliminated. This provision required the objector to the shade caused by growing vegetation, to share the costs of its thinning or removal with the owner of that vegetation, in the first instance of a trespass. The intention was to make objections thoroughly considerate before official presentation and to bring a feeling of "partnership" between the neighbours in question. The elimination of this provision, as agreed to by the Solarians, might judicially appear to be fair, but it may also cause more objections and hard feeling between neighbours.

A. DISCUSSIONS WITH VARIOUS DEPARTMENTS WITHIN CITY HALL

A preliminary draft of the By-law report, together with an internal memorandum requesting comments was forwarded to every department within City Hall (Legal, Clerk's Finance, Housing, Building Inspection, Property, Economic Development, Recreation). Meetings convened to obtain maximum feedback, brought forth the following advice:-

There would likely be "a significant bureaucratic cost to the City in setting up a review process that would be meaningful."

Non-Profit Housing:

The 'protected garden' provision will be controversial.

The costs of panoramic view photographs - to be filed when a solar collector permit is granted - will be expensive to individual homeowners.

"Different camera angles can create disputes between neighbours."

Staff should be trained to handle applications and answer inquiries.

Infill development will be inhibited by this By-law.

B. COMMENT FROM TECHNICAL AGENCIES WITHIN OTTAWA AND RMOC

A covering letter explaining the experimental nature and purpose of the Model Solar Access By-law - as it was now officially called, after incorporating most of the Departmental suggestions - was sent to the following agencies: -

- b. Philosophical or "rationale" questions : as far example, "What public purpose is to be achieved by the proposal?"; "Why impede the densification of existing neighbourhoods?"; "Why not aim towards district (rather than individual home) application of solar access?"; "What is the impact upon the quality of life afforded by the proposed approach?"; "Is it cost-effective?"; "What are the costs of a less-sheltered environment in terms of wind conditions (once you implement the proposed by-law)?"
- c. Warnings : "There is a danger associated with any uni-dimensional view of the urban fabric"; "This proposition will require a fairly wide-ranging analysis"; "(Shade control provisions) would appear to eliminate street trees; is this really intended?"; "The vegetation provisions will be difficult to enforce - it might be best to treat these as guidelines only".
- d. Technical questions and advice - "Use Latin names to describe undesirable (species of) trees"; "Is zoning the best method for doing this?"; "Why slope the solar envelope along the east and west sides?"; "Emphasize that your proposals are for built-up areas" etc.

1. Suggestions for the extension of provisions: Householders and developers who voluntarily conform with the Model By-law should, in return, have their investment protected by having solar access guaranteed. If they treated their neighbours in accordance with this new code of behaviour, they should be deemed to deserve the same.

Bids for public building in the City should be requested with an open encouragement to design in conformance with the Model By-law during the period of trial application.

2. Expressions of satisfaction as residents: "I am pleased to see my tax dollars going into such a potentially useful By-law"; "As a tenant, I should be very happy to see an extension of solar access protection to rental accommodation"; This By-law could form the basis for (a national) law on solar access rights. How can we ignore the rights to solar access for so many people and still consider our country democratic?"; "The (Model Solar Access) By-law appears to be excellent". "The (proposed) Model By-law seems logical and workable"
3. Advice on technical matters: "Indicate that the panoramic view should be a series of photographs taken at eye level and standing on the ground, rotating from 9 a.m. to 3 p.m."; "Make it clearer that the

"Regardless of the method used to achieve solar access protection, the evaluation of the effectiveness of the method is very important."

5. Encouragement and appreciation: "I am sure that the in-roads Ottawa is making in the area of solar planning will be scrutinized closely by others"; "It is the kind of activity and initiative (that) this Ministry is encouraging in all Ontario municipalities"; "I wish you every success in your future endeavours in the case (of solar access protection)."

Some misunderstandings were still to be seen and they were earmarked for improving the wording of the by-law, to avoid giving misleading impressions. For example: "As the by-law principles are presently worded, the use of vegetation as a shading device in summer is expressly forbidden" - This would imply that an emphasis is required on the fact that only if an objection is received, will action be considered towards the removal of a tree.

GA:smr-4

A2D050

S E C T I O N 5

DRAFT OF THE MODEL BY-LAW FOR SOLAR ACCESS PRINCIPLES, AS PRESENTED TO OTTAWA PLANNING BOARD.

CITY OF OTTAWA - VILLE D'OTTAWA

From: Community Development Department Date: _____
 De: _____ Ref. No.: _____
 N° de ref.: _____

Action Exécution	Information Pour votre gouverne	Ward Quartier
☐ Administrative administrative	☒ Policy politique	☒ City-wide

To/A:

☒ Ottawa Planning Board Commission d'urbanisme d'Ottawa	☐ Non-Profit Housing Logement à but non lucratif
☐ Physical Environment Committee Comité de l'environnement	☐ Executive Committee Comité exécutif
☐ Admin., Policy and Priorities Committee Comité de l'adm., des politiques et des priorités	☐ Board of Directors Conseil d'administration
☐ Other Energy Advisory Committee Autre	☐ City Council Conseil municipal

SUBJECT/OBJET

Model Solar Access By-law - principles for built-up areas/Modèle d'arrêté
 municipal sur l'insolation - principes pour les secteurs bâtis. CD-164-6.

FOR INFORMATION

Planning Branch is applying experimentally a set of Model Solar Access By-law principles on all proposals for development submitted in the months of April, May and June, 1983, in order to evaluate the impact of solar access protection on various aspects of development in the City. Compliance to these principles will be voluntary and an award of a SOLAR DESIGN PIONEER certificate will be made to an applicant who submits or modifies a proposal to conform with them.

Suitable publicity to inform developers and stimulate interest in the programme will accompany this experiment.

BACKGROUND

A brief account of the origins and development of the idea of solar access protection in Ottawa is given in Attachment 4. The Council approved an application to the Ontario Ministries of Energy and of Municipal Affairs and Housing in October 1981 and a grant of \$25,000 was obtained under the Energy Conservation Through Land-Use Planning (ECTP) program to develop (a) a set of principles and (b) a process, whereby a municipality with built-up areas, could protect solar access for all properties in them, by reliance on zoning powers, as granted under the amended Ontario Planning Act, 1980.

In January 1982, Planning Branch initiated the formation of citizen committees in Capital Ward and Westboro. The involvement of citizens in the formulation of solar access protection principles was considered essential, because of the large number of value judgements - on existing trees, heritage buildings and streetscape in general - which would be required in the process. The above-mentioned two committees developed the alternative legal approaches to solar access protection: -

Secretariat Use Only
 À l'usage du Secrétariat

- (a) Solar access as a property right granted to property owners by Provincial law, following application by City Council to the Ontario Legislature (developed by Capital Ward Committee);
- (b) Solar access protected through an amendment to the existing Zoning By-law AZ-64 by reliance on powers granted to municipalities under the Ontario Planning Act, 1980 (developed by Westboro Committee).

The first alternative was considered to lie beyond the remit of the above-mentioned ECTP research programme and to be worth pursuing only if reliance on existing municipal powers failed to provide satisfactory solar access protection. The second alternative was developed as a set of principles for such protection by the Westboro Committee and an administrative process (Attachment 2) for their application will be tested during the period April to June, 1983, inclusive.

Following a discussion of their principles for solar access protection with a group of experts on the subject, the Westboro Committee presented them to the residents of Westboro through an information campaign and two public opinion surveys. These produced a majority of 85.9% in favour of solar access protection and acceptance of 9 out of 12 principles. Two of the remaining principles were accepted when further explanations were provided at a public meeting in Westboro and the final one was altered to accord with public opinion.

Planning Branch subsequently circulated the resulting principles to all Departments in City Hall, to 17 technical agencies within Ottawa and the Regional Municipality of Ottawa-Carleton and to a number of community leaders, Federal and Provincial Ministries, organizations and experts in Ontario and Canada. All valid points were incorporated in the Model Solar Access By-law shown on Attachment 1.

DEVELOPMENT OF SOLAR ACCESS PROTECTION PRINCIPLES

Bearing in mind the objectives of the City's ECTP research program to develop a set of principles and a process of protecting solar access in built-up areas, the following options were considered: -

1. Select a legal basis other than zoning, as considered and rejected by the Westboro Committee at the research stage of their deliberations. The alternatives considered - Private Agreement; Doctrine of Ancient Lights; Restrictive Covenants; and Prior Appropriation - were either unacceptable for the legislative framework established in Ontario; or would cause considerable legal expense to private citizens in the City; or would simply take too long to come into effect, because they would require enabling legislation from the Province.
2. Apply and wait for enabling legislation to enforce solar access as a property right. This option will be pursued by the Capital Ward Committee.
3. Search for a vehicle within existing legislation i.e. the Ontario Planning Act, 1980 - to protect solar access as part of municipal responsibility to the public. The best vehicle was considered to be zoning, because it allows a municipal authority to safeguard solar access in the following ways: -
 - a. PERFORMANCE ZONING whereby the desired effect - e.g. the avoidance of shading on certain well-defined surfaces - is stipulated to ensure conformance by designers of later development in the vicinity of the subject lot. This might prohibit full development on that lot, as specified by the local zoning by-law, in order to allow a corridor of sunlight to the stipulated surfaces. Performance zoning might therefore penalize late development on surrounding lots.
 - b. ENVELOPE ZONING whereby the acceptable shape and volume of ultimate development on a lot are specified, in order to safeguard solar access for neighbouring properties. This type of zoning preserves the right to develop a lot, no matter how late the ultimate development envelope

is completed. In the case of solar access protection, the envelope shape may be stipulated by angles of inclination of the roof to ensure the necessary penetration and duration of sunshine on the specified surfaces of neighbouring envelopes.

Although both these types of zoning are permissible in an area, the latter option would be more workable and certainly fairer to property owners in already built-up areas with varying heights and conditions of development - i.e. infill lots, bungalows among 2-storey houses, etc. The predominance of North-South streets in Westboro and other areas of the City, means that there is a possibility of an existing building obscuring part of the south-facing wall of some other building, in which case the best compromise would be some compensatory provision - e.g. part of the lot surrounding the obscured building being designated as a 'protected garden' by reliance on Performance Zoning. This was the approach adopted by the Westboro Solar Access Committee, as shown by the Shade Control Principles of the proposed Model Solar Access By-law. (Attachment 1) Both options of Performance and Envelope Zoning have therefore been used in this By-law.

The innovative nature of the Model By-law principles brought the consideration of testing them before application and the following options were considered: -

- i. Testing by retrospective application over all building permits issued in the last 4-6 months. The disadvantage is that this would not allow a judgement to be passed as to whether designers are prepared to consider solar access protection principles and incorporate them in their design.
- ii. Testing by prospective application over the forthcoming 4-6 months. Designers would receive a SOLAR ACCESS DESIGN GUIDE together with the application form for a building permit and full publicity would be given to the principles and benefits of solar access protection, in order to encourage the conception of projects with these principles in mind. This would avoid wasted effort by designers and minimize corrective application - i.e. modification of proposals to conform with the provisions of the Model Solar Access By-law, after the design concept has been formulated.
- iii. Approve the By-law and apply it without the benefit of prior testing. This would not be in accord with the promised research program when the ECTP grant was obtained.

It is therefore proposed to apply Option (ii) above. The consideration of rewards for developers who opted to conform with the provisions of the Model By-law raised the following options: -

- a. Award a certificate commemorating the pioneering nature of the development in protecting solar access for neighbouring properties;
- b. Guarantee solar access to the property of the developer by imposing the same code of good behaviour on the neighbours;
- c. Award the certificate in addition to guaranteeing solar access to the conforming development.

Option (b) is legally untenable in view of the fact that conformance to the Model By-law will be voluntary during the testing period. Option (c) is therefore also untenable. It is therefore proposed to award a certificate in accordance with (a) above and the design is shown on Attachment 3.

REASONS FOR SOLAR ACCESS PROTECTION

The reasons for considering to regulate solar access protection eventually, should the proposed tests be successful, may be summarized as follows: -

- i. There is a basic need that people feel for sunlight and the public opinion surveys in Westboro amply confirmed this. According to PERSPECTIVES ON ACCESS TO SUNLIGHT (Ontario Ministry of Energy, 1980) the present absence of regulations on this need, is "blindly one-sided" in favour of unrestricted building development with no respect for the sunlight enjoyed by surrounding residents.

- ii. In an increasingly energy-conscious era and a northerly latitude, it would make good sense to protect solar access as early as possible, in order to encourage the exploitation of an inexhaustible source of energy. Any technological breakthroughs in this field are likely to come from northerly latitudes and high technology areas in particular. As an aspiring 'high technology' area, enjoying nearly 2000 hours of bright sunshine a year - a higher annual average than many holiday regions in Canada - Ottawa could not remain indifferent to solar access protection.
- iii. Over 300 householders in the Ottawa-Hull region have already taken the initiative of building or retrofitting passive and active devices to exploit solar energy. The growth of renewable energy organizations in the area and the fact that the suggestion of protecting solar access in Ottawa South came as early as 1977, call for a municipal initiative in this direction.
- iv. Solar access protection at the present stage in the City's growth would ensure an open and airy urban environment. The respect for existing solar access to surrounding properties would not preclude high density development, but it would help to keep it in character with the existing environment in Ottawa.

The next logical question in legislating solar access concerns the surfaces to be protected from obstruction. The Westboro Committee considered the results of heliodon tests on a number of alternative building shapes. (A heliodon traces the sunpath over a given latitude of the earth on any day of the year and allows the shading cast by various shapes to be photographed.) A consultant was subsequently engaged to test the application of key angles, concepts and principles of solar access on 88 homes selected on a half-kilometer grid in Capital Ward and Westboro. The results of these two types of tests (in the laboratory and in situ) indicated the feasibility of protecting solar access in 62% - 77% of all existing homes, on the surfaces shown on Table 1.

Table 1: Surfaces and Reasons for Solar Access Protection

<u>Surface</u>	<u>Reason for Protection</u>
Roof:	Least controversial location for passive or active collection of solar energy; Allows tilting and revolution of exposed surfaces to receive maximum solar radiation during the day and the year.
South Wall:	Allows penetration of sunshine into a building for at least six (6) hours, helping to reduce the heating load considerably in summer; May accept vertical or tilted surfaces for the collection of solar energy.
East and West Eaves Strips:	Automatically protected by virtue of clearance between buildings of equal eaves height; Great potential for continuous solar collector surface with roof, to allow sunshine penetration into north-east and north-west rooms.
Part of Garden with Southern Aspect:	Offers potential for solar energy use to grow natural food, to every family; Preserves the right to build a greenhouse or solarium as a family's prosperity grows; Sole surface offering scope for compensatory arrangements through the transfer of solar access protection in the case of properties obscured by non-conforming structures or existing vegetation.

As regards the elements which could be controlled to ensure solar access protection on the above surfaces, the Westboro Committee studied the following:-

1. Building shape and volume of neighbouring properties;
2. Open area surrounding the buildings on all properties;

3. Landscaping, signs, accessory buildings, etc., casting shade beyond the boundaries of a lot.

The first two elements may be regulated through existing zoning with controls currently available to a municipality. The third may be regulated through site plan control in the case of new development, but not in existing development. This necessitates shade control powers which are not currently available to Ontario municipalities.

The choice of existing zoning legislation as the expedient vehicle for solar access protection, may be justified on the following grounds:-

- i. It requires minimal legislative change, once the Model By-law has been tested and proven to be workable;
- ii. It preserves the right to build up to the ceiling of permissible development under existing zoning regulations on every site - i.e. it does not penalize vacant site or low-rise building owners, for late development.

The Model Solar Access By-law principles include provisions for all these three elements to make testing comprehensive, but shade control provisions will require enabling legislation from the Province, if Council decides to implement them.

The testing of the Model Solar Access By-law principles has been extended from the area of Westboro (for which the Model was designed) to City-wide application, in order to provide insight on its performance over a wider range of designs and development situations. Part of the feedback expected from this testing will be the suitability of the Model for areas of various densities and building types in the City. Other information to be collected during this testing will be as follows: -

- i. Economic Impact: Positive or negative effects on building volume and number of jobs. Building permit delays and additional interest costs, if any.
- ii. Environmental Impact: On design trends, on streetscape and landscape, on new buildings and extensions.
- iii. Social Impact: Relations between neighbours, increase in litigation, etc.
- iv. Costs and Benefits: To the developer, to the City, to the residents of the resulting buildings, to the neighbours of these buildings, etc.
- v. Impact on Administrative Costs and Procedures in the issue of zoning amendments and building permits. Definition of procedures for solar access verification and streamlining with existing processes.
- vi. Unforeseen Problems, Impacts and Opportunities

A report giving this information and describing all the types of development on which the Model Solar Access By-law was applied, together with a statistical analysis of the number of designers that opted to conform with its provisions, will be presented to Council soon after completion of all tests in June 1983.

INPUT FROM OTHER SOURCES

The following committees, organizations and institutions have provided input to this report:

City of Ottawa: Legal Department
Non-Profit Housing
Westboro Solar Access Protection Committee
Capital Ward Solar Access Protection Committee
Regional Municipality of Ottawa-Carleton
National Capital Commission

Ottawa Hydro Commission
 Ottawa Fire Department
 Ottawa Police Force
 Commercial and Industrial Development Corporation
 Bell Canada
 Ottawa Gas
 Ottawa Property Administration, Public Works Canada
 Ottawa CPAB, Ministry of Municipal Affairs and Housing
 Ottawa Separate School Board
 Ottawa Board of Education
 Ottawa Cablevision Ltd.
 Skyline Cablevision Ltd.
 Ottawa Association of Architects
 Ottawa Branch, CMHC
 National Research Council, Solar Energy Projects
 Community Associations
 Canadian Institute of Planners
 Lawyers specializing on environmental and solar access interests
 Association of Professional engineers of the province of Ontario
 Solar Energy Society of Canada Inc.
 Selected municipalities prominent in energy conservation
 Canada Mortgage and Housing Corporation
 Headquarters of Ontario Ministries related to the natural and built
 environment, as well as energy

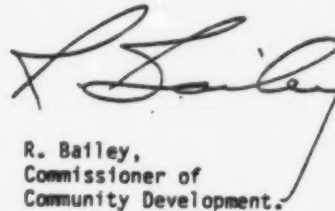
ATTACHMENTS

- Attachment 1: Model Solar Access By-law principles.
- Attachment 2: Administrative Process charts for the application of the Model Solar Access By-law principles.
- Attachment 3: Proposed design for SOLAR DESIGN PIONEER certificate.
- Attachment 4: Origins and development of solar access protection principles in Ottawa.
- Attachment 5: Summary of comments received.

DISPOSITION

Legal Department to prepare Model By-law from the principles shown on Attachment 1.

Community Development Department to prepare SOLAR ACCESS DESIGN GUIDE and to initiate testing and By-law performance monitoring procedures, as shown on Attachment 2.



R. Bailey,
 Commissioner of
 Community Development.

GA:smr-21
 A18027
 07/29/82

MODEL SOLAR ACCESS BY-LAW PRINCIPLESPreamble

The principles forming this model are divided into three parts, each corresponding to a type of control required to provide complete solar access protection to a property on a subject lot, as follows:-

1. Control on building shape and volume on the neighbouring lots;
2. Control on building coverage of all lots;
3. Control on the extent and duration of shade produced by signs, accessory buildings, fences and vegetation on neighbouring lots.

The first two may be regulated through zoning and controls are now available to municipalities in Ontario. The third type of control requires powers which are not presently available and principles falling in this part have been separated for convenient reference. The proposed trial application will involve all three types of control, in order to test the feasibility of complete solar access protection.

PARTS 1 AND 2PROPOSED ZONING AMENDMENTS TO AZ-64 TO PROTECT SOLAR ACCESS

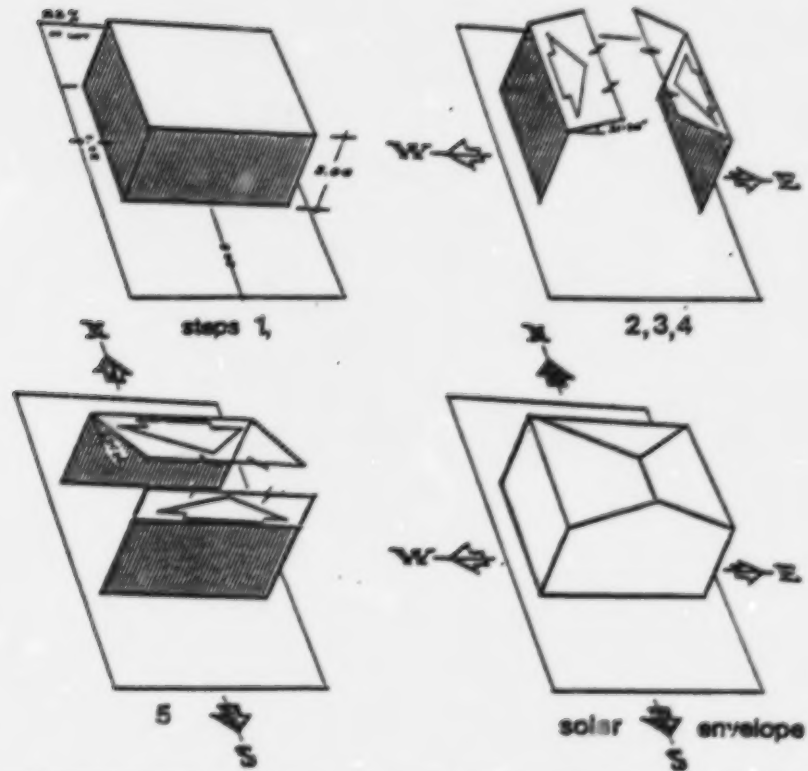
through currently enforceable controls on building shape, volume and lot coverage.

A. DEFINITION

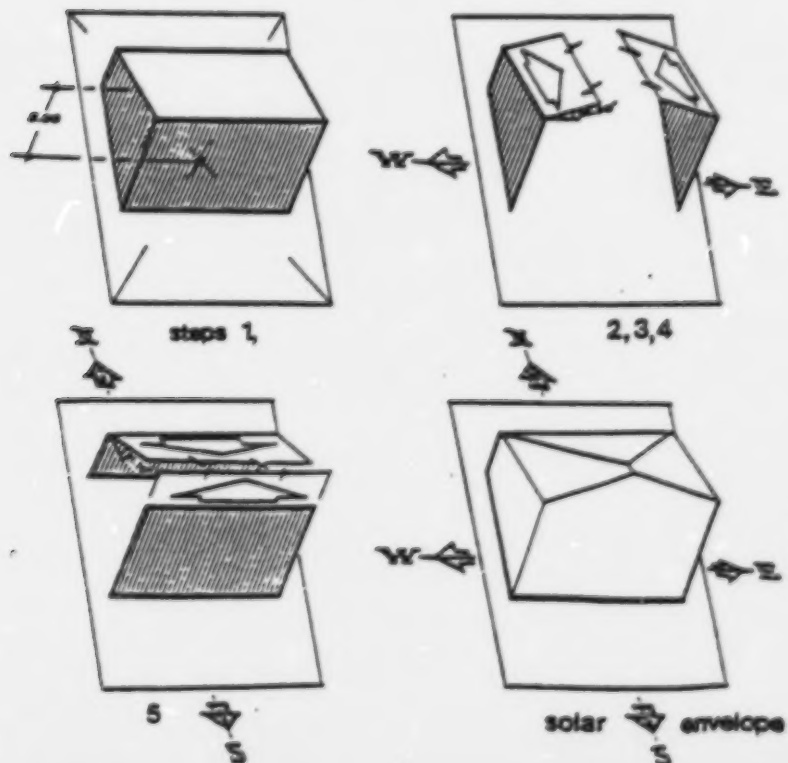
The 'building envelope' defined in AZ-64 to contain the maximum development permissible on a lot, may be drawn by marking the vertical planes along the front, side and rear setbacks and assuming a horizontal ceiling of development at the maximum building height permissible in a particular zone. It is proposed that this 'building envelope' be modified to become a SOLAR ENVELOPE, as follows:-

- i. A maximum eaves height shall be assumed at 8.00 m above average ground level in any lot (see Step 1 on Diagram). (The objective of this height is to avoid casting shade on buildings across a street or across back gardens).
- ii. Along the East, West and North sides of the lot, the ceiling of development shall be sloped at an angle of 21°.30' with the horizontal, to extend from the above-mentioned maximum eaves line to the centre of the lot, to intersect with the horizontal plane at maximum permissible building height (Steps 2, 3, 4). (The objective of the slopes on the ceiling of development is to maximize the penetration of sunshine in built-up areas with densities similar to Westboro. Adjustments will have to be introduced for other areas, following the trial application).
- iii. Along the South side of the lot, the vertical plane along the setback line shall be extended upwards to meet the sloped ceiling of development and the horizontal plane at maximum permissible building height. (Step 5).

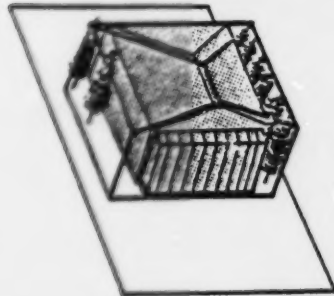
CONSTRUCTION OF THE SOLAR ENVELOPE (LEVEL SITE)



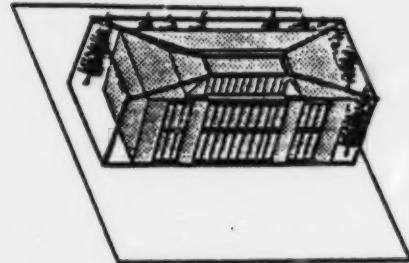
(SLOPING SITE)



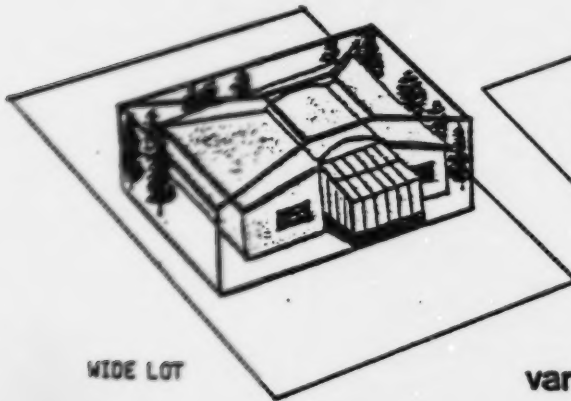
The proposed amendment produces a variety of shapes to allow sunlight penetration in accordance with lot orientation, depth and size, as shown below:-



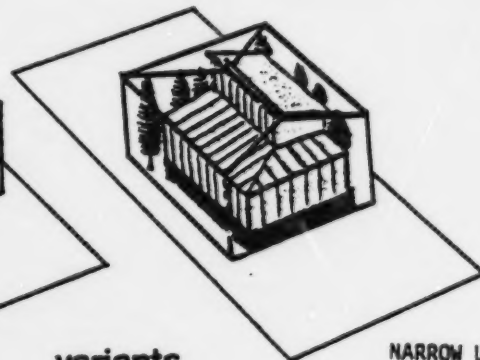
NORTH-SOUTH LOT



EAST-WEST LOT

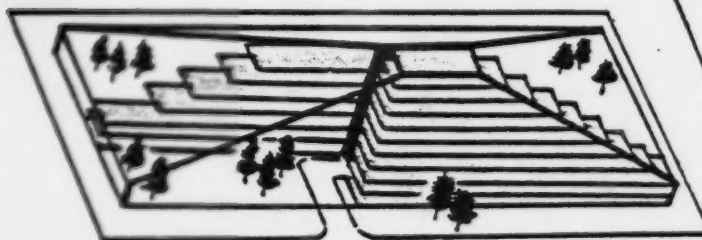


WIDE LOT

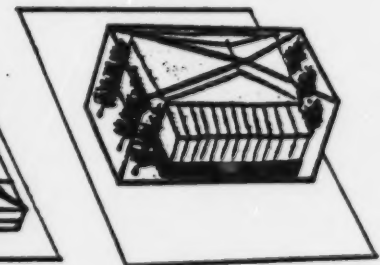


NARROW LOT

variants



LARGE LOT



SHALLOW LOT

B. APPLICATION

All new development or addition to an existing development shall be contained within the solar envelope appropriate to the subject lot. In accordance with the provisions of the Planning Act, 1990, all existing structures shall enjoy non-conforming rights.

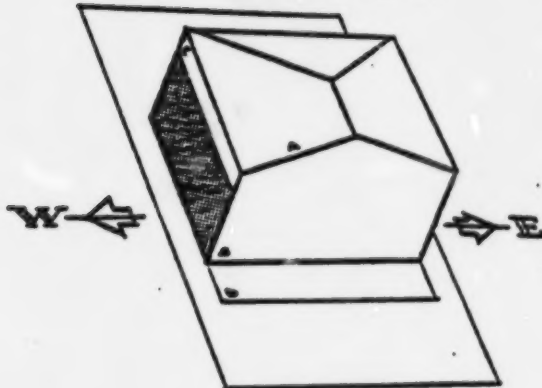
PART 3

PROPOSED SHADE CONTROL PRINCIPLES TO PROTECT SOLAR ACCESS

through control on the extent and duration of shade cast by signs, accessory buildings, fences and vegetation.

A. DEFINITIONS

- (i) **SHADE CONTROL:** A control on the duration and area of shade, produced or likely to be produced on a 'protected surface' by proposed building development, sign or growing vegetation.
- (ii) **PROTECTED SURFACE:** A surface exposed to sunlight by virtue of its location on the following planes of a 'solar envelope' (as defined in PARTS 1 and 2).



- A. The sloped or horizontal planes of the envelope ceiling;
- B. The South vertical plane;
- C. A 100 cm deep strip on the East and West planes;
- D. 10% of the lot area on the south side of the property, or any other reasonable location selected and registered by the owner with the City Energy Planner, to be referred to as 'PROTECTED GARDEN'.

The objective of relocating a 'protected garden' shall not be to restrict development on an adjacent lot, but to compensate for inadequate solar access on 'protected surfaces' A, B and C, due to existing development or vegetation. Solar access to a relocated 'protected garden' shall be protected through spot performance zoning stipulations on the relevant adjacent lots.

- (iii) **SOLAR COLLECTOR:** A material surface exposed to sunlight, measuring a minimum of 60 x 60 cms in length and width, or 3600 sq. cms in area and forming the cover of an enclosure, in which, by passive or active means, it collects and stores heat.
- (iv) **EXEMPTIONS FROM SHADE CONTROL:** All existing buildings, accessory structures, signs and designated or listed vegetation shall be exempt from shading control.

B. PRINCIPLES

- (i) **REGISTRATION of the transfer of a PROTECTED GARDEN:** A protected garden shall be assumed to adjoin the south side of the principal building on a lot. It shall measure the full dimension of that building on that side, multiplied by the appropriate width to give an area equal to 10% of the lot area.

Part or the whole of a protected garden may be transferred to any other part of a lot, by application for a Registered Transfer to the City.

Within twenty-one (21) days of receipt of an application, the City shall notify and request comment on the proposed transfer from the owners of properties on the East, South and West sides of the subject lot.

The location determined after due consultations, shall be entered on a Map of Registered Transfers of Protected Gardens in the City of Ottawa, which shall be available for inspection at all reasonable times.

- (11) **PERMIT FOR THE INSTALLATION OF A SOLAR COLLECTOR:** A property owner or agent wishing to retrofit one or more solar collectors on an existing structure, shall submit an application for a Permit, including a drawing of the entire installation in plan(s), elevation(s) and section(s).

All applicants shall ensure that an existing or new structure shall have a safe margin of additional bearing capacity and stability to bear the proposed collector(s).

New development which is to incorporate solar collectors as defined in A (111) above shall require no special permit for their installation.

All applicants shall produce and submit a photographed panoramic view showing the structures, signs and vegetation on the East, South and West sides of the subject lot, taken at eye level, while standing in the middle of the 'protected garden'. This panoramic view shall be filed with the application for future reference on shade control.

- (111) **VARIANCE, NOTIFICATION AND PUBLIC HEARING:** A variance shall be sought from the Committee of Adjustment for a proposed sign, development or part of a development, which exceeds the volume of the Solar Envelope on the subject lot and casts a shadow obstructing more than 15% of the area of a solar collector on a protected surface in a neighbouring lot.

Diagram(s) of the shade to be cast by the proposal on December 21st at hourly intervals from 9:00 a.m. EST to 3:00 p.m. EST, shall be produced by Council and within 21 days of receipt of the Application for Variance, circulated with the appropriate notification to all residents affected by the shades projected on the diagrams. The notification shall explain the proposal and the procedure for making objections.

Any objection by a resident to the shading likely to be cast on a protected surface by a proposed development shall result in a public hearing of the case, unless the applicant modifies his proposal to the satisfaction of the Council.

- (iv) **OBSTRUCTION BY GROWING VEGETATION:** Any existing or new vegetation which, through natural growth after the adoption of the present regulation by Council, exceeds the permitted 15% obstruction of sunlight on a solar collector on any day of the year, shall be liable to thinning or cutting and removal of the parts casting the objectionable shading. Should the owner of the solar collector object to this shading, he shall notify the trespass to the City. Following certification of trespass, the City will send 90 days' notice to the owner of the vegetation specifying the part(s) to be removed within that period.

Failing compliance by the owner of the vegetation within the specified period, the City shall execute the work and charge the expenses to the owner of the vegetation.

- (v) NEW VEGETATION: Following complete removal, any replacement of the vegetation shall be located within the solar envelope for the subject lot and conform as regards ultimate height and volume. The following species of trees are considered undesirable: Willow, White Ash, Elm, Soft Maple, and all types of Poplar. (Latin names to be included in legal text).
- (vi) FENCES AND HEDGES: Property line fences exceeding the permitted 15% obstruction of sunlight shall conform to the provisions of this By-law.

C. APPLICATION

The shade cast by a sign, chimney, dormer, mechanical equipment on the roof, fence, garage, accessory building, or part of a building erected after the passage of this By-law, or by a vegetation planted after the passage of this By-law shall not exceed 15% of the area of a solar collector on a protected surface of a neighbouring property.

All existing signs, chimneys, dormers, fences, garages and accessory buildings shall enjoy non-conforming rights.

ADMINISTRATIVE PROCESS CHARTS
FOR THE APPLICATION OF THE MODEL
SOLAR ACCESS BY-LAW PRINCIPLES

Preamble

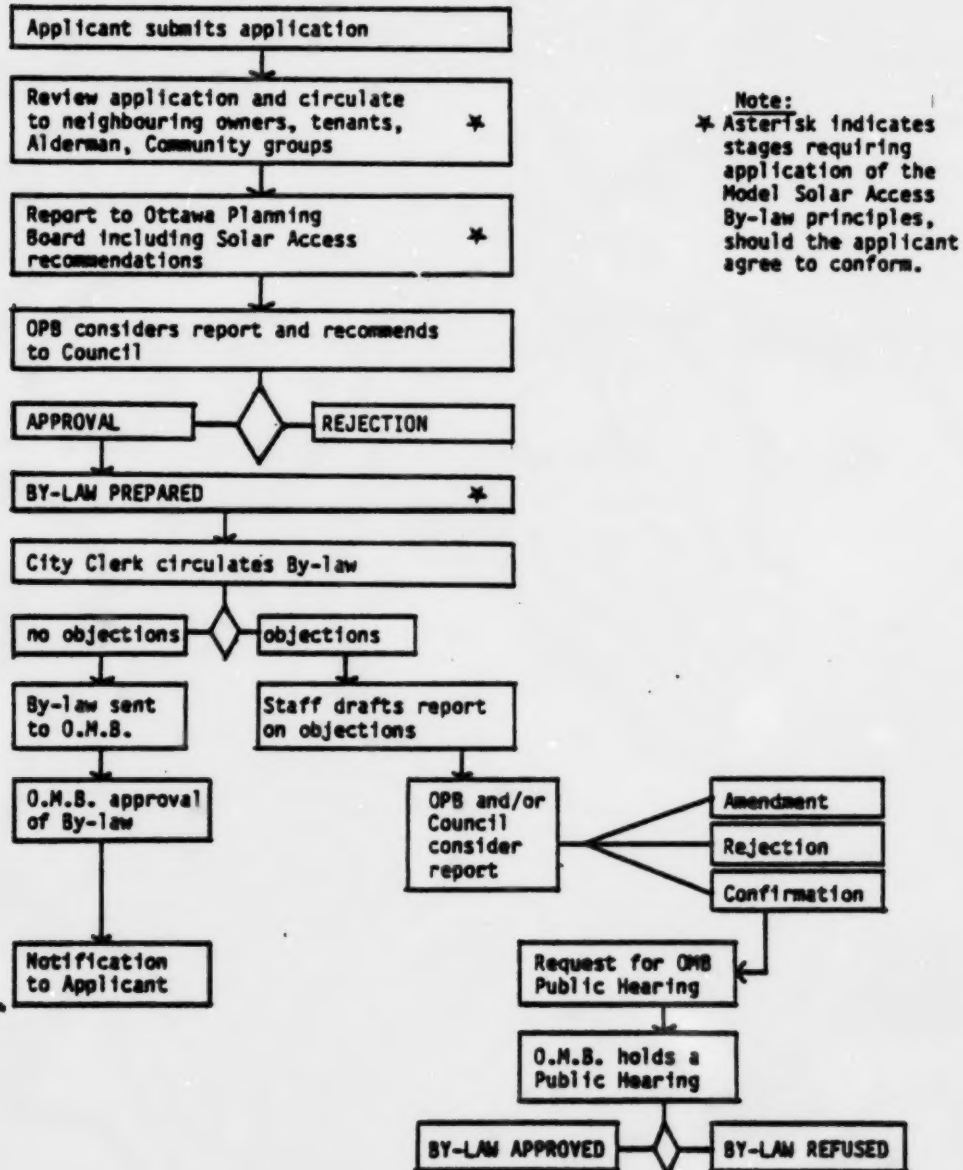
The administrative processes for the application of the Model Solar Access By-law principles to proposed development in the City, may be divided into four parts as follows: -

- A. Application as part of the Zoning process;
- B. Building Permit issue procedure;
- C. Site Plan Control;
- D. Procedures which are an inherent part of the By-law itself.

All these parts will be tested as far as practicable, in view of the fact that conformance to the By-law will be entirely voluntary during the trial period. Each procedure will be modified as necessary in the light of experience and an estimate of its cost will be included in the evaluation of costs and benefits of the By-law.

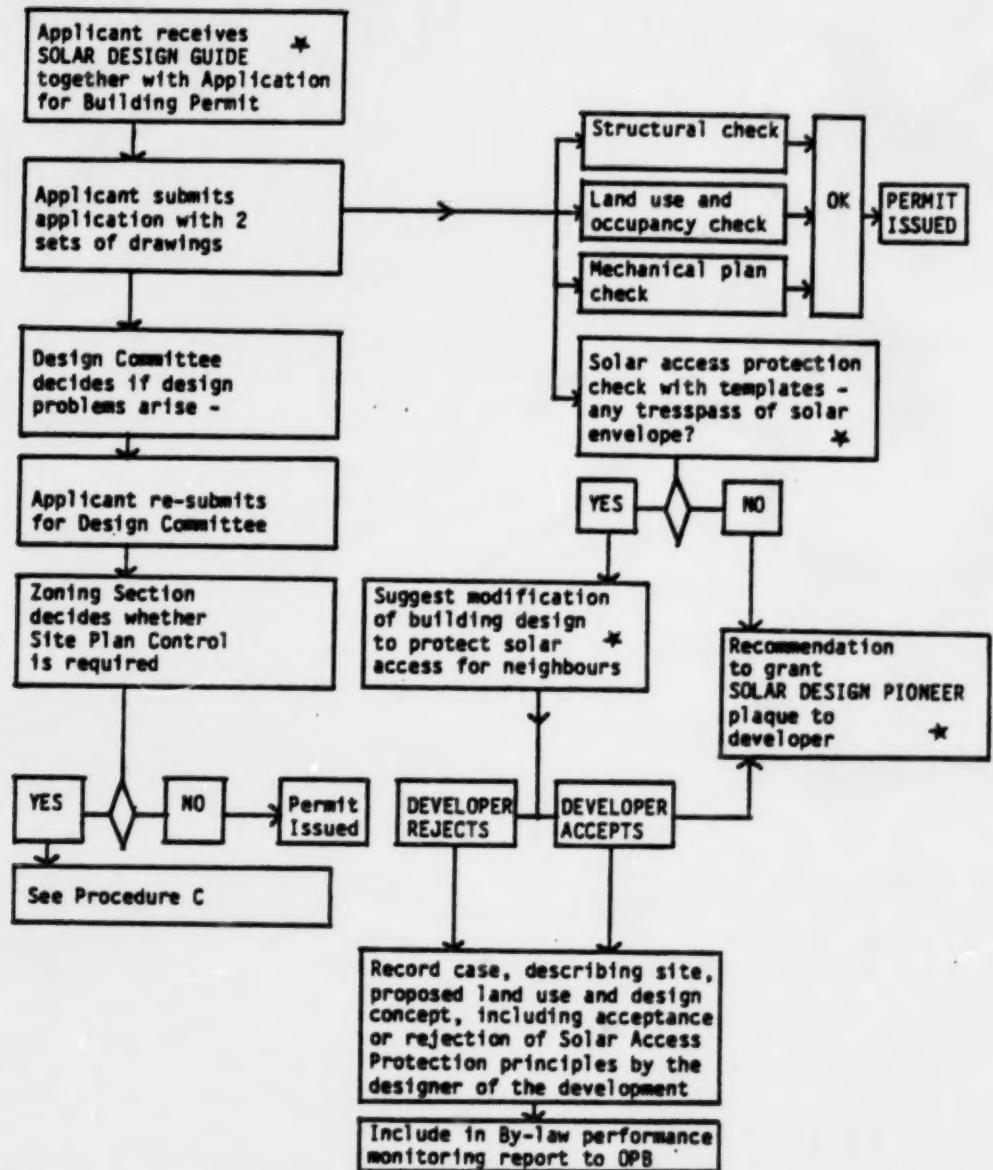
PROCEDURE A

APPLICATION FOR ZONING OR REZONING A PROPERTY



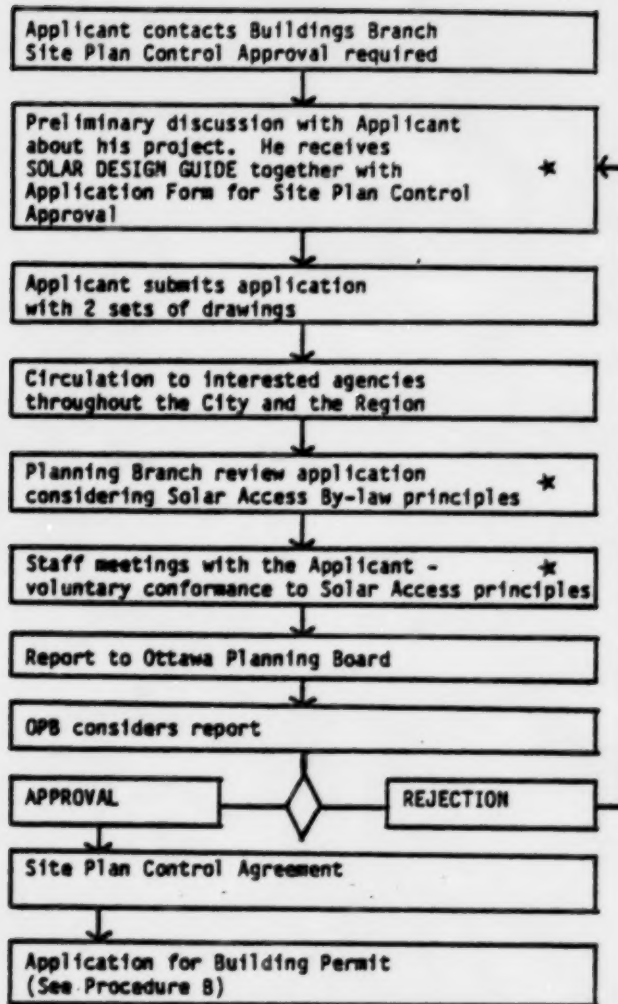
PROCEDURE B

APPLICATION FOR A BUILDING PERMIT



PROCEDURE C

SITE PLAN CONTROL



PROCEDURE D (1)**APPLICATION FOR THE TRANSFER
OF A PROTECTED GARDEN**

Applicant proposes transfer
to City Energy Planner (CEP)
stating reasons and suggesting
alternative location(s)

Preliminary investigation on
feasibility of transfer by CEP
and notification to neighbours
on the East, South and West
(E.S.W.) within 21 days of
application

Note:

ESW stands for East, South, West

Comment by neighbours E.S.W.

AGREE

DISAGREE

Site meeting between applicant,
neighbours and CEP to agree
on Solar Envelope modifications
necessary for transfer of
applicant's Protected Garden

Report to OPB including
recommendation on transfer
and performance zoning
amendments on solar
envelopes of neighbouring
lots ESW

OPB recommends to Council

Council decision on transfer
and Zoning amendment

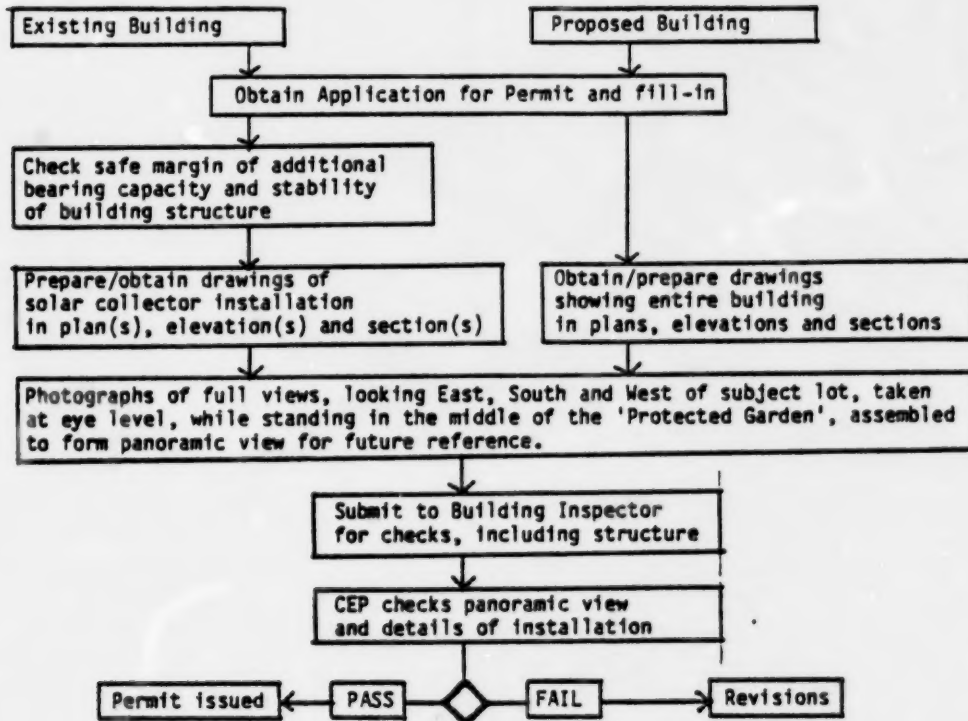
NO

Notification
to
Applicant

YES

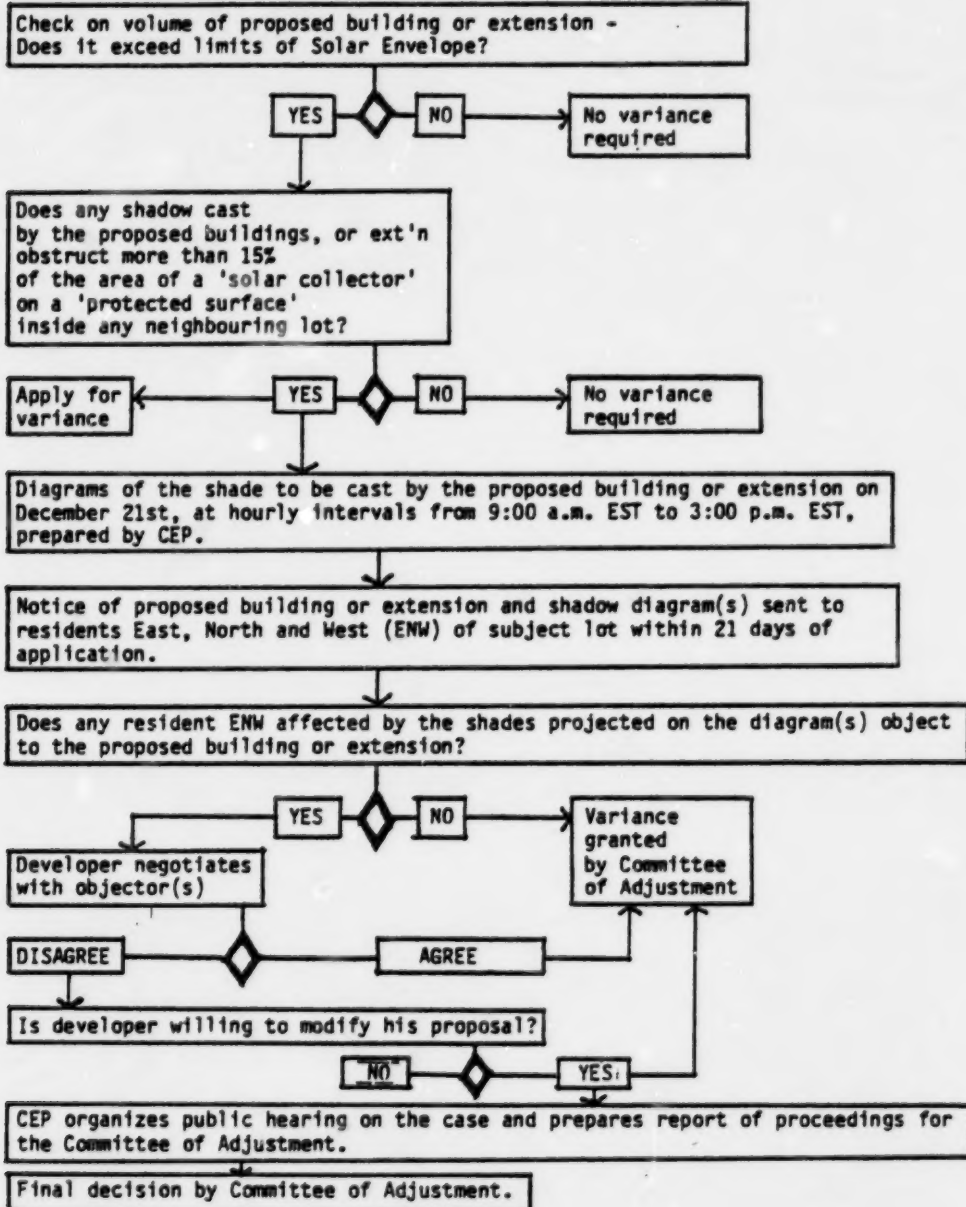
Entry of transfer on
MAP OF REGISTERED TRANSFERS
OF PROTECTED GARDENS

Notification with copy of
zoning amendment to applicant
and neighbours ESW, advising
registration on property titles(s)

PROCEDURE D (ii)APPLICATION FOR A PERMIT
TO INSTALL A SOLAR COLLECTOR

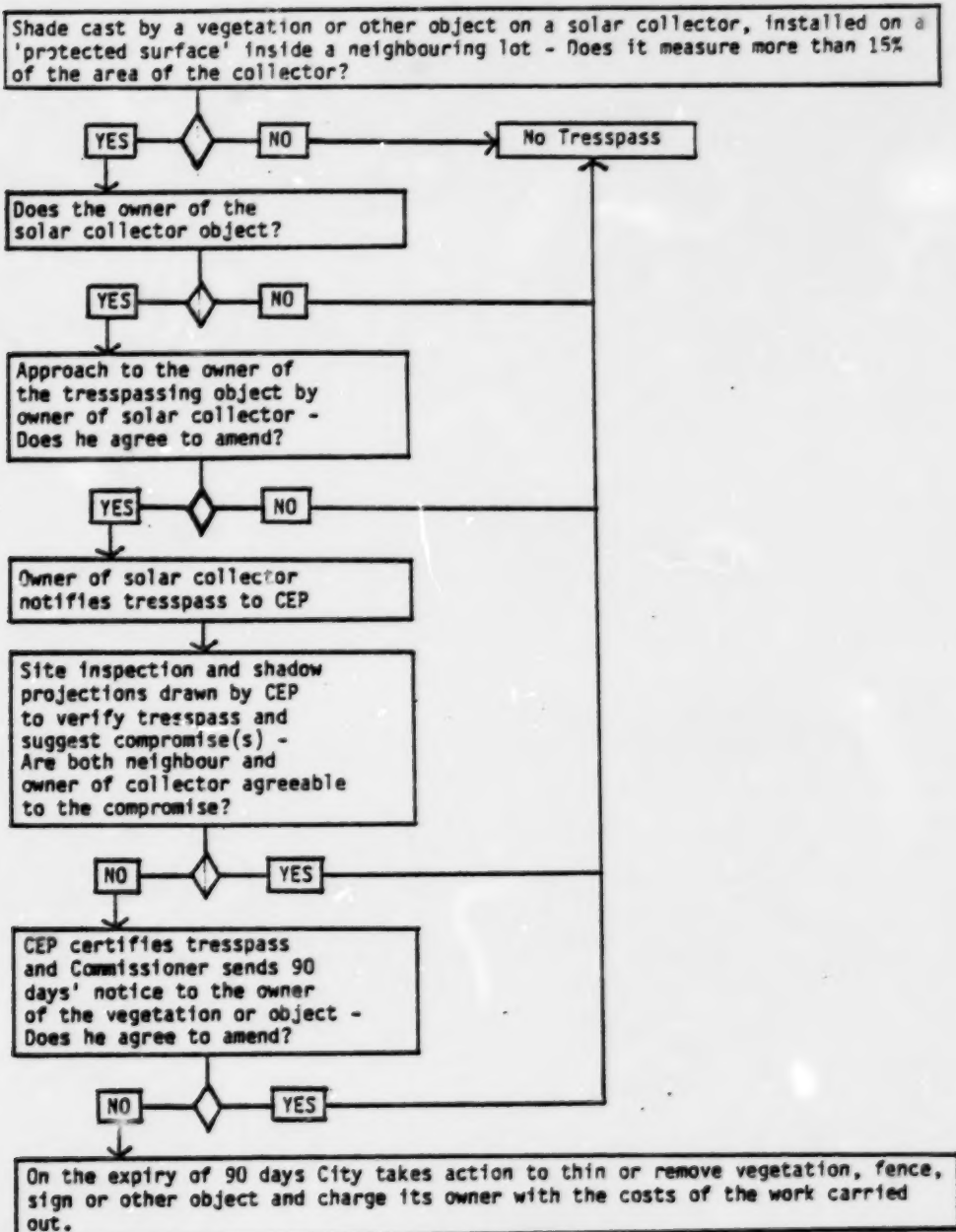
PROCEDURE D (111)

VARIANCE, NOTIFICATION AND PUBLIC HEARING



PROCEDURES D (iv), (v) and (vi)

OBSTRUCTION OF SUNLIGHT BY GROWING VEGETATION, NEW VEGETATION, FENCES, SIGNS AND OTHER OBJECTS



Proposed design for SOLAR DESIGN PIONEER certificate

In accordance with the criteria
adopted by the municipal Council

Selon les critères adoptés
par le Conseil municipal

(APPLICANT/REQUÉRANT)

designed a building which
incorporates innovative
features for the utilization of
solar energy and the
enjoyment of solar access by
neighbouring properties.

a conçu un édifice qui comporte
un système original de capter
l'énergie solaire sans
porter atteinte au droit
à l'ensoleillement des
propriétés voisines.

address/adresse

date

THE ORIGINS AND DEVELOPMENT OF SOLAR ACCESS PROTECTION PRINCIPLES IN OTTAWA

The idea of protecting solar access for properties in Ottawa was suggested in the course of neighbourhood studies in Ottawa South in 1977-78. The approved Ottawa South Plan 1979 included a recommendation to initiate a feasibility study for solar access protection and in March 1981, the Planning Branch issued Discussion Paper CD-164-6 titled PLANNING MEASURES TO SAFEGUARD SOLAR ACCESS FOR PROPERTIES IN OTTAWA. The simplest method of legally establishing this access in Ottawa was considered in this study to be through the modification of existing zoning and of specific requirements affecting developable space and landscaping in and around a lot.

On October 7, 1981, City Council approved an application to the Ontario Ministries of Energy and of Municipal Affairs and Housing for a grant of \$25,000 under the Energy Conservation Through Land-use Planning Program to complete research already in progress in the Branch, on the subject of 'SOLAR ACCESS PROTECTION IN BUILT-UP AREAS'. A favourable response to this application was received from the Ministry in January 1982.

In late January and early February 1982 public meetings on solar access protection were held in Capital Ward and Westboro and committees of local residents were set up to draft appropriate provisions for each area. Capital Ward Committee opted to establish provisions to enforce solar access protection as a property right, while Westboro Committee opted for a zoning amendment to AZ-64, to ensure such protection. Proposals were ready by April 28, 1982, when they were discussed at a public meeting with legal and other experts assembled at the Glebe Community Centre by the Solar Energy Society of Canada Inc. and the City of Ottawa. The comment received at this meeting, persuaded the Westboro Committee to present their proposals to the residents of that area.

This presentation took the form of a public awareness campaign on solar access protection, involving publicity on television and newspapers, an exhibition on Sun Day 1982, a mobile visual display, two opinion surveys in Westboro and a public meeting to discuss the results of these surveys at Westboro Community Centre.

The first opinion survey involved the distribution of a two-page statement and questionnaire on the proposed provisions for solar access to some twelve hundred (1200) households in Westboro. A response was received from five hundred and eighty six (586) households, with eighty five point nine (85.9%) percent expressing an opinion in favour of the principle of solar access protection, five point nine (5.9%) percent against and eight point two (8.2%) percent being undecided.

The second opinion survey involved a more detailed survey form, as requested by some three hundred (300) residents. It presented respondents with all the options that confronted the Westboro Committee in drafting the provisions. A total of one hundred and twenty-eight (128) responses were received and the results indicated that in nine (9) out of twelve (12) propositions, the majorities in favour ranged from sixty point nine (60.9%) percent to one hundred (100.0%) percent. In the remaining three (3) propositions, opinion ranged from a slight majority in favour, to ninety (90.0%) percent opposition. At the public meeting on July 8, 1982, the Committee provided more detailed explanations or compromised in favour of the views expressed by the respondents on the above mentioned three (3) propositions.

The resulting principles were circulated to all Departments in City Hall and constructive input was received from Legal Department, Zoning Operations Division in Buildings Branch, Current Operations Division in Planning Branch and from Non-Profit Housing. In the second round the circulation comprised all

Technical Agencies in Ottawa and the Regional Municipality of Ottawa-Carleton (utilities, commissions, professional associations, research councils, CMHC, CIDC, OBE and Public Works Canada). In the final circulation, comment was requested from community leaders and community associations in Ottawa, headquarters of Ontario Ministries related to energy and the environment, national institutes, lawyers specializing in environmental and solar access matters, selected municipalities prominent in energy conservation and members of all Advisory Committees on Solar Access Protection in Ottawa. The response was mostly positive and offered advice on various technical aspects.

All comments received were critically examined by Planning Branch and valid points were incorporated in the principles shown in Attachment 1.

Summary of the stages in the development of the Model Solar Access By-law: -

- | | |
|-------------------------|---|
| Stage | 1: Recommendation to initiate a study on the feasibility of solar access incorporated in Ottawa South Plan, 1979. |
| | 2: Application for an ECTP research grant to complete studies. |
| | 3: Development of principles by Westboro Advisory Committee on Solar Access. |
| | 4: Circulation to various agencies for comment. |
| <u>(CURRENT STAGE):</u> | 5: Information Report to Ottawa Planning Board on trial application to monitor performance of principles. |
| | 6: Report on monitoring study to Council and re-formulation of By-law. |
| | 7: Approval of final By-law. |
| | 8: Implementation. |

SUMMARY OF COMMENTS RECEIVED ON THE PROPOSED MODEL SOLAR ACCESS BY-LAWA. DISCUSSIONS WITH VARIOUS DEPARTMENTS WITHIN CITY HALL

A preliminary draft of the By-law with a request for comments was forwarded to every department within City Hall (Legal, Clerk's, Finance, Housing, Building Inspection, Property, Economic Development, Recreation). Meetings convened to obtain maximum feedback, brought forth the following advice:-

Legal Department: Enabling legislation from the Province in respect of the Shading Control Provisions should be applied for only after the results of monitoring the performance of the Model By-law on solar access protection are known.

Zoning Regulations Division: Buildings Branch: Community Development Department

The method of disseminating the provisions of the model by-law in order to make designers consider a "solar approach" at the inception stage of a new project, should be thoroughly considered. Suggesting revisions to an applicant should be only the second option.

Current Operations: Planning Branch: Community Development Department

The Solar Envelope definition should mention features like chimneys, dormers, roof additions, garages and other accessory buildings which AZ-64 allows to be built beyond the ultimate development envelope.

The formation of a Building Permit Review Committee by the Westboro Solarians to "evaluate solar access needs as they are affected by new development" should be considered.

There would likely be "a significant bureaucratic cost to the City in setting up a review process that would be meaningful."

Non-Profit Housing:

The 'protected garden' provision will be controversial.

The costs of panoramic view photographs - to be filed when a solar collector permit is granted - will be expensive to individual homeowners. "Different camera angles can create disputes between neighbours."

Staff should be trained to handle applications and answer inquiries. Infill development will be inhibited by this By-law.

B. COMMENT FROM TECHNICAL AGENCIES WITHIN OTTAWA AND RMOC

After incorporating most of the above suggestions, the Model Solar Access By-law was sent with a covering letter explaining the experimental nature and purpose of the proposal and requesting comment from the following agencies: -

- Regional Municipality of Ottawa-Carleton
- National Capital Commission
- Ottawa Hydro Commission
- Ottawa Fire Department

- Ottawa Police Force
- Commercial and Industrial Development Corporation
- Bell Canada
- Ottawa Gas
- Ottawa Property Administration, Public Works Canada
- Ottawa CPAB, Min. of Municipal Affairs and Housing
- Ottawa Separate School Board
- Ottawa Board of Education
- Ottawa Cablevision Ltd.
- Skyline Cablevision Ltd.
- Ottawa Association of Architects
- Ottawa Branch, CMHC
- National Research Council, Solar Energy Projects

The response may be summarized as follows:-

- a. Complimentary comment : to the effect that "the City of Ottawa is to be commended for attempting to deal with the difficult problem of protecting solar access in built-up areas".
- b. Philosophical or "rationale" questions : as far example, "What public purpose is to be achieved by the proposal?"; "Why impede the densification of existing neighbourhoods?"; "Why not aim towards district (rather than individual home) application of solar access?"; "What is the impact upon the quality of life afforded by the proposed approach?"; "Is it cost-effective?"; "What are the costs of a less-sheltered environment in terms of wind conditions (once you implement the proposed by-law)?
- c. Warnings : "There is a danger associated with any uni-dimensional view of the urban fabric"; "This proposition will require a fairly wide-ranging analysis"; "(Shade control provisions) would appear to eliminate street trees; is this really intended?"; "The vegetation provisions will be difficult to enforce - it might be best to treat these as guidelines only".
- d. Technical questions and advice - "Use Latin names to describe undesirable (species of) trees"; "Is zoning the best method for doing this?"; "Why slope the solar envelope along the east and west sides?"; "Emphasize that your proposals are for built-up areas" etc.

Once more, relevant suggestions among the above were incorporated in the Model By-law.

C. SUGGESTIONS FROM COMMUNITY LEADERS, MINISTRIES, ORGANIZATIONS AND EXPERTS

The final circulation list ranged to a variety of addresses in Ontario, but national organizations with branches in Ontario sent the Model By-law to their headquarters for comment and response was received from as far west as Richmond B.C. and Halifax, N.S. The types of organization requested to provide comment were as follows:-

- Members of all Advisory Committees on Solar Access Protection
- Community Associations
- Canadian Institute of Planners
- Lawyers specializing on environmental and solar access interests
- Association of Professional engineers of the Province of Ontario
- Solar Energy Society of Canada Inc.

- Selected municipalities prominent in energy conservation
- Canada Mortgage and Housing Corporation
- Headquarters of Ontario Ministries related to the natural and built environment, as well as energy.

The response may be summarized as follows: -

1. Suggestions for the extension of provisions: Householders and developers who voluntarily conform with the Model By-law should, in return, have their investment protected by having solar access guaranteed. If they treated their neighbours in accordance with this new code of behaviour, they should be deemed to deserve the same.

Bids for public building in the City should be requested with an open encouragement to design in conformance with the Model By-law during the period of trial application.
2. Expressions of satisfaction as residents: "I am pleased to see my tax dollars going into such a potentially useful By-law"; "As a tenant, I should be very happy to see an extension of solar access protection to rental accommodation"; This By-law could form the basis for (a national) law on solar access rights. How can we ignore the rights to solar access for so many people and still consider our country democratic?"; "The (Model Solar Access) By-law appears to be excellent". "The (proposed) Model By-law seems logical and workable"
3. Advice on technical matters: "Indicate that the panoramic view should be a series of photographs taken at eye level and standing on the ground, rotating from 9 a.m. to 3 p.m."; "Make it clearer that the maximum of 8.00m height of the street facade is intended to preserve solar access for houses across the street or the rear gardens," "December may be too cloudy a month in some locales, to justify spatial requirements for no shading"; "Concern about shading from vegetation (on) 'any day of the year' is probably justified for active solar systems, (but) for passive systems which meet primarily space heating needs, (access) during the heating season - say September to May - might be quite adequate"...."Distinguishing between deciduous and coniferous trees and between active and passive collector systems would aid in clarifying these issues".
4. Negative comment: "The (proposed) 'solar envelope' concept does not appear to have any great value for an existing 'downtown' area. As most of the existing properties in this area are 'non-conforming' to some extent, the use of the solar envelope will only add to the paperwork burden of existing approval mechanisms. Almost all cases will be forced to the Committee of Adjustments for decisions."

"A more practical approach would be to provide solar rights only to those individual property owners who have made a significant investment in solar energy use. This 'significance' would be measured by the design contribution to the heating load, whether this is domestic hot water or space heating, achieved by active or passive means. A ten percent contribution would seem appropriate. Contribution assessment methodology would be that used by the American states which offer tax deductions on this basis."
5. Encouragement and appreciation: "I am sure that the in-roads Ottawa is making in the area of solar planning will be scrutinized closely by others"; "It is the kind of activity and initiative (that) this Ministry is encouraging in all Ontario municipalities"; "I wish you every success in your future endeavours in the case (of solar access protection)."

Some misunderstandings were still to be seen and they were earmarked for improving the wording of the by-law, to avoid giving misleading impressions. One comment, for example, ran as follows:- "As the by-law principles are presently worded, the use of vegetation as a shading device in summer is expressly forbidden" - This would imply that an emphasis is required on the fact that only if an objection is received, will action be considered towards the removal of a tree.

The current version of the Model By-law, as shown in Attachment 1, incorporates an appropriate response to most of the comments received. It will be possible to respond to the others - particularly the negative comments - only after the testing of the By-law has been completed in June, 1983. In all cases, the contribution received will be acknowledged.



S E C T I O N 6

FINAL RESULTS

As the concluding section of this report, this chapter consists of recommendations in the following three areas:-

- A. Results of the experimental application of solar access protection principles (the Principles);
- B. The Principles, as finalized in the light of the experimental application and circulation to over 70 experts and organizations in Canada;
- C. Recommended procedures for the development of local principles, the enactment and day-to-day administration of solar access protection.

Throughout this section, the underlying objective is to produce results which will be found useful to Ontario municipalities with built-up areas.

A. THE EXPERIMENTAL APPLICATION OR MODEL SOLAR ACCESS PRINCIPLES.

The objective of this application was to evaluate the impact of solar access protection on various aspects of development in a city like Ottawa. Secondary objectives relevant to this project may be summarized as follows:-

- 1. Test whether a voluntary measure towards solar access protection would be effective;
- 2. Confirm whether the administrative procedures contemplated for implementation were workable;
- 3. Establish problem areas in solar access protection in a city - e.g., application to a rapidly developing Central Business District.

4. Establish the type of enquiries, objections and unforeseeable problems arising in the application of solar access protection with a view to developing solutions before implementation.

As an incentive to voluntary conformance, a SOLAR DESIGN PIONEER programme of certification was announced in the local newspapers as shown in Attachment 2 at the end of this Section.

METHOD OF APPLICATION

The four-month period of application from April to July 1983 inclusive was divided into two parts as follows:-

- i) Retrospective application in which development proposals already issued with a permit were examined as to conformance to solar access protection requirements for neighbouring properties;
- ii) Prospective application in which a SOLAR DESIGN GUIDE explaining the principles of solar access was forwarded to all designers and contractors listed in the Yellow Pages with an invitation to submit development proposals currently in their programme of work and conceived with 'solar in mind'.

Proposals which contained several units of accommodation - e.g., dwellings - were examined in terms of conformance by the individual unit and the scheme as a whole was therefore judged on the basis of a "percentage of conformance". Classifications were produced as to land use and the solar features incorporated in a proposal.

RESULTS

A total of 2,346 units of accommodation were examined during the application as tabulated in Attachment 3 at the end of this Section. Full conformance was achieved by nearly 60% of this total, while 33% required slight modification to conform and about 7% required major change. Conformance was often due to pure chance - e.g., a proposal in a sparsely-built and little-subdivided area in which development could not obstruct the sun to any neighbour. The dissemination of information on solar access - through the SOLAR DESIGN GUIDE and through advice freely given to designers across the Energy Conservation Counter on the 7th floor of City Hall helped to improve the percentage of conforming applicants by about 15%.

In view of the fact that the majority of applicants were conforming and bearing in mind the significant improvement due to the dissemination of design information, it was decided to propose a voluntary rather than a mandatory measure on solar access protection. An Opinion Survey on this and related questions on solar access, did not favour this decision (see Attachment 3), but it was nevertheless resolved to experiment with a voluntary measure for at least a year.

COST/BENEFIT ANALYSIS

The administrative impact of a solar access protection measure was assessed in terms of the workload imposed on the municipality and the benefit to the community. For a city of some 300,000 people the manpower

requirement was a full-time Energy Planner, aided by a part-time Building Inspector in Spring and Summer when the number of applications could be expected to mount. Secretarial help would amount to about an hour a day. The use of computer software for the verification of proposals as to containment within the solar envelope for their particular site could reduce this workload significantly. The benefits to the community on the other hand - in terms of energy efficiency, the enjoyment of sunshine by every household and an open, airy environment in a city as a whole - were rather abstract and could not be assessed in dollar terms.

The economic impact of a solar access protection measure depends on its effect on proposed building volume. The experimental application indicated that if conformance to the by-law principles had been mandatory, a total of 46.2% of the development proposals examined would have to be reduced by 2% to 11% of their building volume in order to conform. In the case of large schemes however, if the developer accepted a pyramidal - rather than tower block - configuration for his scheme, an additional 26% to 32% of dwelling units would have been accommodated on the site, though at 7% to 12% higher cost for foundations. The additional dwellings would amply compensate the developer for these costs and leave him a wider margin of profit than the tower block design. As the statistical base for the above figures justifies a level of confidence of about 95%, there may be some variation outside these limits for individual cases.

Proposals conceived 'with solar in mind' and submitted during the Prospective Application of the solar access protection principles, required no reduction in building volume whatsoever. This implies that given appropriate guidelines, imaginative designers would always come forward

with solutions to satisfy both the client's requirements for accommodation and the neighbours' expectations for solar access. Solar energy gains due to various design features were estimated to save between 8% and 21% of all energy bills throughout the life of these buildings.

As regards vacant sites, the economic impact of a solar access protection measure would be related to its effect on zoning. The value of a site would not be affected in the case of areas zoned for 3-storey or lower development - i.e., the vast majority of Canadian urban areas. In the case of more intensive development zones, an adverse effect could be expected to increase with permitted height. It is questionable whether on a parcel of land on which 20 storeys were permissible however, a developer would propose a massive prism, 20-storeys high to cover every cubic metre of the developable envelope. The usual proposal would be 2 or 3 tower blocks to allow for ventilation, parking, landscaping, etc. A pyramidal development shape would be the more profitable alternative. Additional incentives could be offered by allowing a mix of compatible uses, to promote energy efficiency through greater scope for multi-purpose trips and greater community self-containment in general.

The social impact of a solar access protection measure over the brief 4 months of experimentation in Ottawa could only be considered beneficial. Residents neighbouring major development proposals became more assertive and vociferous in their objections to possible overshadowing. There was no litigation or any reduction in housing units because conformance to the solar access protection principles was voluntary.

The Environmental impact of the measures experimented with could not be judged over the brief period of experimentation. There was certainly no adverse impact on new or existing buildings, trees or streetscape. Good designers and landscape architects could skillfully arrange the accommodation and trees they wanted without much sacrifice in building volume or landscaping. The provision for non-conformance of existing trees could be assumed to protect the entire generation of present vegetation and only over the long-term of some 30 to 40 years could an effect on existing streetscape be expected. This effect could be a slow transition towards a 'habitat landscape' which keeps low-growth, deciduous vegetation on the south side of homes and allows dense-foliage evergreens on the north side.

It appears that solar design features - e.g., sun decks, balconies, greenhouses, solaria, large double - or triple-glazed windows to the south, patio doors, sky lights, etc. - have a firm hold on current architectural design trends and there was ample evidence of this in the applications for building permit examined during the period of experimentation. The angular geometry of solar architecture, together with the provision of outdoor spaces which were landscaped, designed and oriented for the enjoyment of sunshine (see examples in Attachment 3) presented an exciting prospect for the urban environment in densely populated areas.

IMPLICATIONS FOR PROFESSIONAL EDUCATION

Beyond the assessment of impacts on urban development, the experimental application made it possible to evaluate also a glaring lack of emphasis on certain aspects of professional education. This emphasis concerns the self-

evident fact that south orientation of a lot - i.e. east-west direction of streets - is the most important factor in the utilization of solar energy and the avoidance of shade on neighbouring properties in a city. The education of land surveyors, urban planners, architects and other 'subdividers' of the raw land for development should therefore underline this fact in an era of scarce energy resources.

CONCLUSION

The experimental application of solar access protection principles helped to prove the following points:-

1. That a voluntary measure could be effective, if accompanied with suitable incentives for developers;
2. That the administrative procedures adopted for the day-to-day administration of solar access protection (see Section C of Attachment 1, SOLAR DESIGN GUIDELINES) were workable;
3. That the problem area in solar access protection in Ottawa - and probably in many other Ontario municipalities - was likely to be the densely and rapidly developing Central Business District. Parts of Spark Street Mall, where a measure of protection has been established, should be assiduously safeguarded;

4. That allowance should be made for flexibility and revision of a solar access protection measure by making provision for review at the end of the first year of application. Should a voluntary conformance measure prove unworkable despite the provision of incentives for such conformance, a municipal council should seriously consider adopting a mandatory measure - i.e., a by-law;
5. That substantial and permanent net benefits were likely to accrue by the official adoption of a solar access protection measure, regardless as to whether a cost/benefits analysis is carried out quantitatively or qualitatively.

The effort of the Local Advisory Committees in the Glebe, Ottawa South and particularly Westboro have therefore been well worthwhile and the City of Ottawa is grateful to each and every member of these Committees.

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B. RECOMMENDED PRINCIPLES OF SOLAR ACCESS PROTECTION FOR BUILT-UP AREAS

The objective of this part of the final section is to crystallize the essentials of a solar access protection measure. A distinction must be made between mandatory and voluntary conformance measures, because although their objective of solar access protection may be the same, the difference in approach to achieve conformance, requires such measures to have a different content and style, as follows:-

1. Mandatory measure - e.g., a by-law or other set of statutory regulations - specifies, in strictly legal terms, what shall be done or carried out by a developer in order to allow solar access to neighbouring properties surrounding a subject site;
2. Voluntary conformance measure - e.g., a guideline - provides suggestions for the optimum utilization of solar energy on the subject site, an outline of methods of controlling various aspects and consequences of development to prevent overshadowing neighbouring properties and illustrates the administrative procedures involved in the implementation of the measure. In order to stimulate and encourage conformance, it may also stipulate various incentives to be offered to developers. In the case of solar access protection however, such a stipulation may not be practical, as every site and development proposal will have, or will generate, its own specific problems and opportunities. Publicity on the measure however, may indicate the possibility of incentives being offered to developers who conform.

The Model By-law Principles for Solar Access Protection, as developed by the Local Advisory Committees on Solar Access, were clearly intended as a mandatory measure. Following their experimental application however, when a voluntary measure appeared feasible and Planning Branch decided to recommend such a measure to City Council (at least for the first year of implementation) the Principles were extended and refined through a process of circulation to relevant experts and organizations. The resulting SOLAR DESIGN GUIDELINES are shown in Attachment 1.

INCENTIVES FOR CONFORMANCE

It should be noted that the SOLAR DESIGN GUIDELINES, for reasons stated earlier, do not include a list of incentives to be offered to developers to encourage conformance. The publicity which will accompany the issue of these GUIDELINES to the public however, will emphasize the possibility of incentives being offered to developers. It will also be clearly indicated that these incentives will not be exchanged on a quid-pro-quo basis, but in accordance with the problems and opportunities arising on a particular site. The types of incentive which appear to be available in the context of the City of Ottawa would be as follows:-

- a. Relaxation of setbacks and sideyards to simplify the projection of the 'solar envelope' for a particular site;
- b. Relaxation of parkland allocation requirement for large sites, particularly if a central or other covered plaza is provided within a scheme;
- c. Higher density of residential development on particular parts of a site;
- d. Higher intensity of land use - e.g., the incorporation of commercial areas within a residential zone;
3. Mixed land use to allow a variety of interrelated activities likely to be generated by a community - considered within and around a proposed development.

By-law AZ-64 of the City of Ottawa includes Zone R0 (reproduced on the following 3 pages) which allows a variety of land uses approximating general service area requirements for a community. Similar clusters of facilities varying in scale and variety in accordance with the projected size and socio-economic characteristics of a community will be found in Section 7 of the Final Report on the ECTP Research Study ENERGY USE AND LAND-USE PATTERNS IN THE CITY, from which Diags. 18-20 were reproduced as examples.

R0 ZONE

PERMITTED USES

63. The following uses only shall be permitted in the R0 Zone:

(a) Public Uses:

all the public uses as set out in section 18

(b) Residential Uses:

all the residential uses as set out in section 37

(c) Commercial Uses:

(i) *hotel, motel and motor hotel*,

*By-law 356-82
C.C. 15/12/82

*(ii) medical facility or dental facility

*By-law 25-82
C.C. 20/01/82

(iii) office, other than a medical facility or dental facility*

(iv) a studio, if no disturbing noise, odour, vibration or radiation is produced

*By-law 259-68
C.C. 19/08/68

(v) the following uses, if located in a building occupied by a use set out above in this section:

(A) bank

(B) barber shop

(C) beauty parlour

(D) drug store

(E) dry cleaner's distribution station

(F)

Deletion by
By-law 100-76
C.C. 13/03/76

(G) florist shop

(H)

Deletion by
By-law 65-77
C.C. 21/03/77

(I) optician

(vi) private lodge, club, fraternity or sorority house

(vii) notwithstanding the provisions of subsection (2) of section 17 an existing building on an existing lot may be converted to a private lodge, club, fraternity or sorority house if there is no alteration to the exterior of the building except for the required fire escapes, extra windows and entrances and provided that the building when converted complies with the provisions of the building by-law

and the parking provisions of this by-law,

*By-law 311-65
C.C. 06/12/65

(viii)

Deletion by
By-law 31-75
C.C. 03/03/75

*(ix-a) restaurant - full service,

*By-law 60-83
C.C. 02/03/83

(ix-b) restaurant - fast food,

(ix-c) restaurant - take out,

(ix-d) restaurant - dining lounge,*

(x) building or use accessory to the above provided that the building is not used for human habitation,

*(xi) tuck shop if:

*By-law 65-77
C.C. 21/03/77

(a) there is no visible indication from the exterior of the building that such a use is being carried on,

(b) the access is controlled access, and

(c) the building is located more than four hundred and fifty-seven (457) metres from an establishment corner store*

FRONT YARD

64. In the R0 Zone the provisions of section 46 shall apply.

SIDE AND REAR YARDS AND OTHER OPEN SPACES

65. In the R0 Zone the provisions of "-" section 47 shall apply.

*Deletion by
By-law 305-68
C.C. 07/10/68

MINIMUM LANDSCAPED OPEN SPACE

66. In the R0 Zone the provisions of section 49 shall apply, except that in the case of a building having ten per cent (10%) or more of its gross floor area occupied by offices (not including the building rental office), medical or dental clinic, "hotel, motel and motor hotel" or public parking structure, a minimum of fifteen per cent (15%) of the lot area shall be landscaped open space.

*By-law 151-70
C.C. 01/06/70
Amended by
**By-law 356-82
C.C. 15/12/82

PARKING

*67. In the R0 Zone:

*By-law 411-78
C.C. 20/12/78

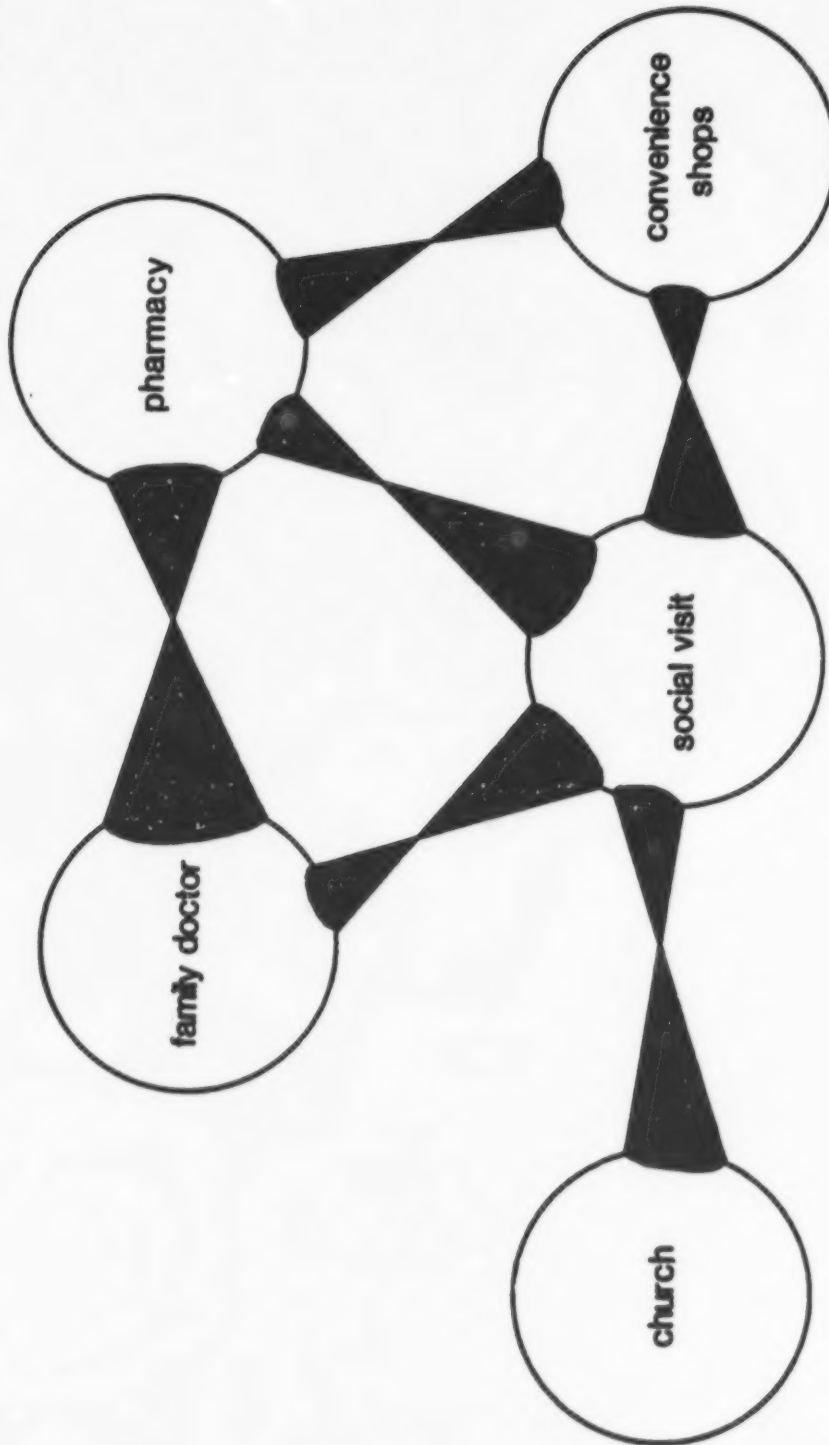
(a) the provisions of section 13 shall apply:

(b) all required parking spaces shall be on the same lot with the building, and

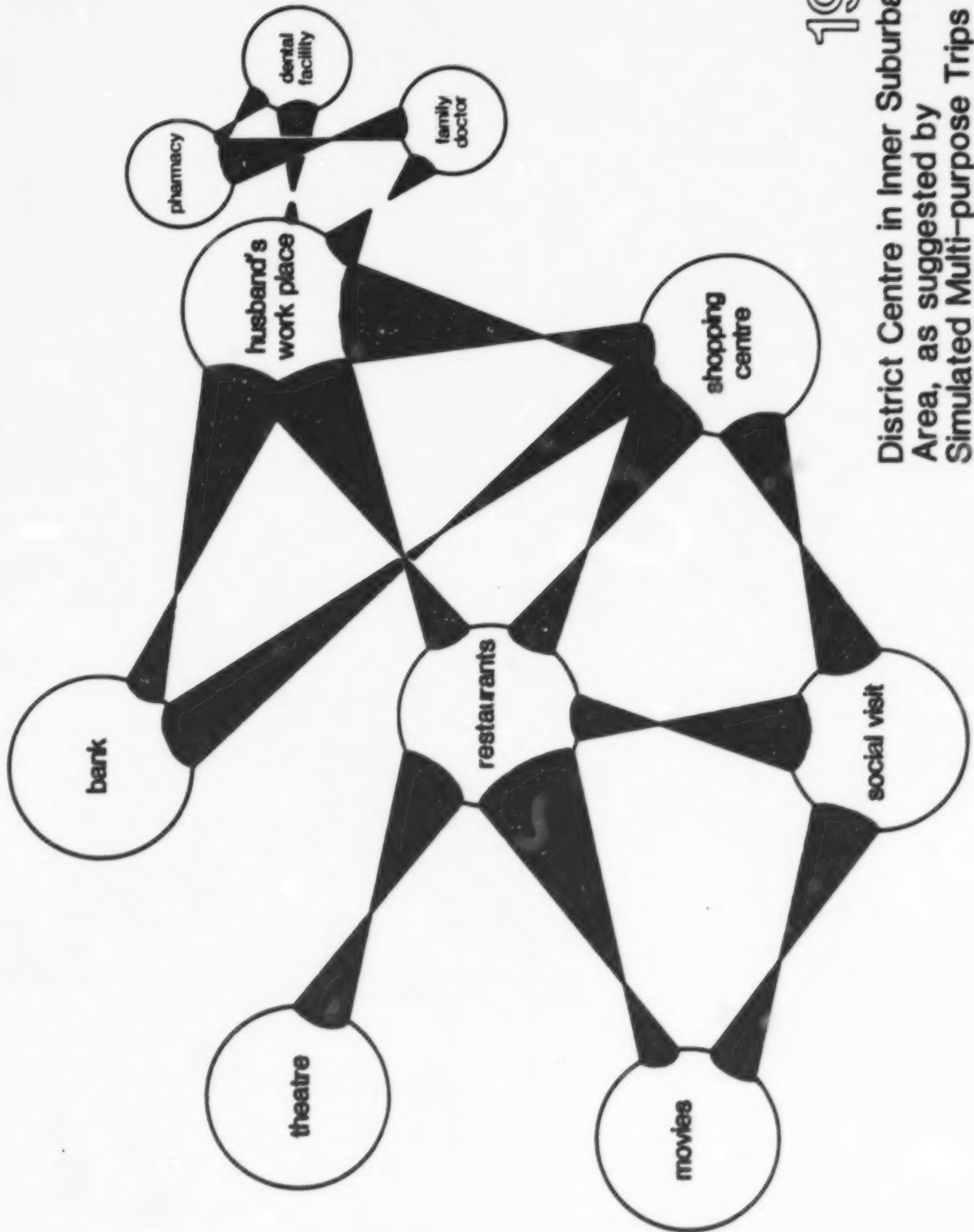
(1) in the case of single family dwellings:

(A) any required parking space may occupy any open space on the lot other than a front yard or a required side yard abutting a street, and

- (3) any parking space not required by this by-law, being By-law Number A2-64, as amended, may be located in a front yard or a side yard abutting a street, provided it is further located only in the driveway which leads directly and unobstructed from the public highway or street to the required parking space established pursuant to subparagraph (A) hereof,
- (ii) in the case of apartment dwellings constructed on or before December 20, 1978, any required or provided parking space may occupy any open space on the lot other than a front yard or a required side yard abutting a street, and
- (iii) in the case of apartment dwellings constructed after December 20, 1978, any required or provided parking space may occupy any open space on the lot and shall be subject to the provisions of Section 17a.,
- (iv) in the case of any use not otherwise recited in this paragraph, all parking spaces may occupy any open space on the lot other than a front yard or a required side yard abutting a street,
- (c) access to and from all parking areas shall be designed so that all vehicles shall enter and leave in a forward direction.*

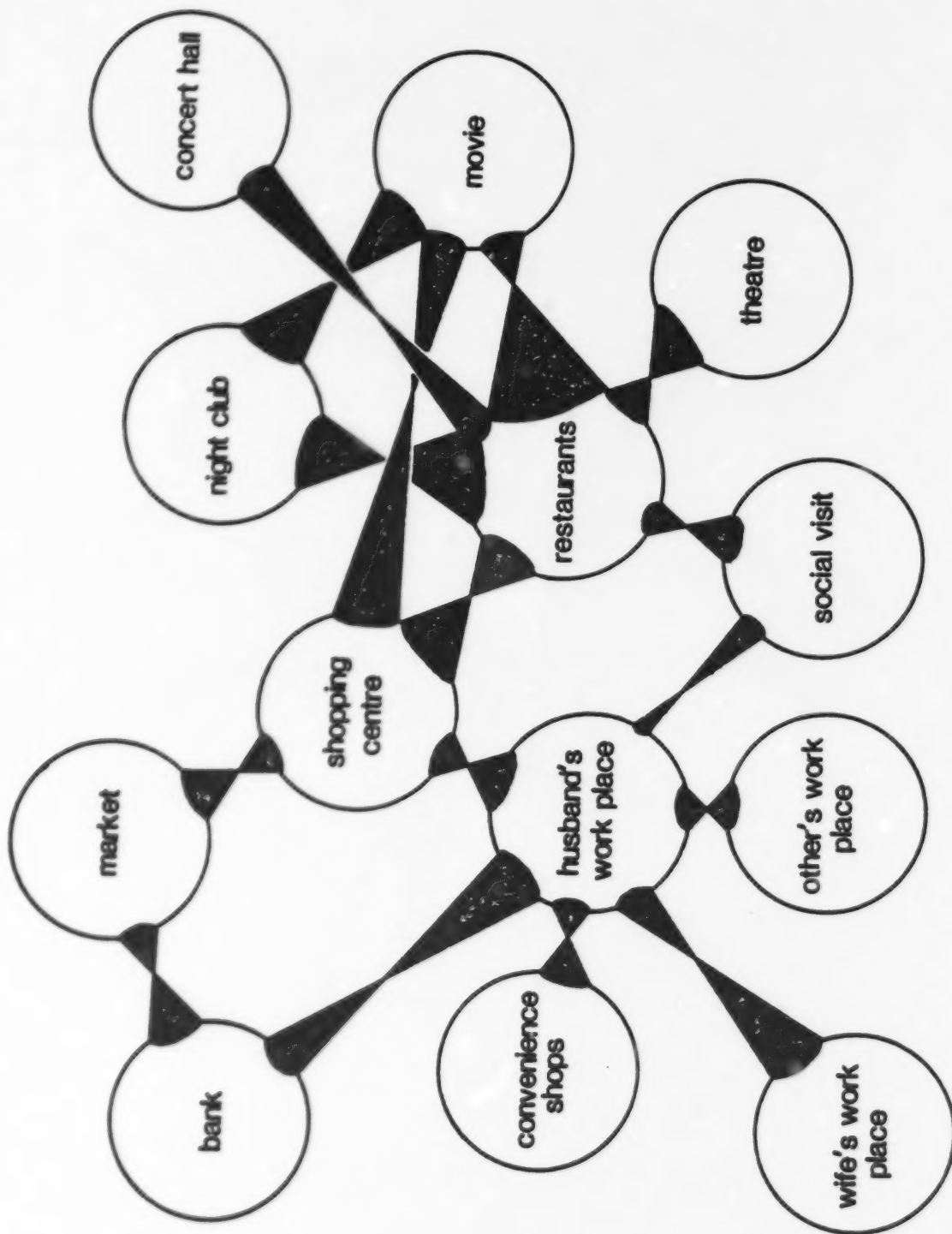


000181



19

District Centre in Inner Suburban
Area, as suggested by
Simulated Multi-purpose Trips



000183

20

Downtown Complex Suggested by
Simulated Multi-purpose Trips

C. RECOMMENDED PROCEDURES

An Ontario municipality considering the introduction of a solar access protection measure for its built-up areas, should initiate or establish the following distinct procedures for this purpose:-

1. Development of local principles for solar access protection to properties in selected built-up areas;
2. Circulation of principles to a panel of experts and organizations, prior to experimental application and official adoption of a solar access protection measure by the municipal council;
3. Day-to-day procedures for the implementation of solar access protection.

Examples of all these procedures will be found in various attachments to the Ottawa Council report at the end of this section and they will be outlined here for convenient reference.

1. DEVELOPMENT OF LOCAL PRINCIPLES FOR SOLAR ACCESS PROTECTION

Attachment 4 at the end of this section describes the origins and development of solar access protection principles in Ottawa and the main stages may be summarized as follows:-

- i. Carry out a preliminary technical study to establish current levels of solar access protection, the feasibility of extending such access to more profitable levels (e.g. roof solar access being extended to cover south-wall access) and setting out the advantages and disadvantages of solar access protection in the local context;

- ii. Initiate public debate through the dissemination of the results of the technical study, set up public meetings in selected communities and form local Advisory Committees on Solar Access. The built-up areas of these communities should include a variety of building heights and layouts - e.g., north-south and east-west streets - trees, heritage buildings, etc.
- iii. Over a series of working sessions, the Local Advisory Committees consider legal options in solar access protection and develop main principles for safeguarding such access to every property;
- iv. Organize a meeting between the Committees and a panel of legal and technical experts on solar access to examine and refine the main principles.
- v. Publicize the principles in the community through a special awareness campaign, including exhibitions and public lectures.
- vi. Carry out one or more Public Opinion Surveys to establish consent or dissent of the local community on: -
 - (a) the idea of solar access protection; and
 - (b) the principles put forward by the Committees;

- vii. Present preliminary report to City Council setting out the principles, results of the opinion polls and a programme for circulation to experts and an experimental application of solar access protection principles.
- viii. Carry out the experimental application of the principles over a sufficiently wide area of the municipality to ensure a diversity of cases being examined and a variety of procedures being applied to obtain reliable results. A cost/benefit analysis of solar access protection in the local context should also be carried out at the conclusion of the experiment.
- ix. In view of the statistical results and conclusions of the experiment, determine whether a voluntary conformance measure would suffice or whether a mandatory by-law would appear essential to safeguard solar access in the local context.
- x. Draft the measure decided upon and circulate to Local Advisory Committees, legal and technical experts and community associations for comment. If the by-law option has been selected, this drafting should be carried out by the municipality's Legal Department. If the voluntary conformance option has been selected on the other hand, a set of guidelines should be produced with three distinct parts:-

- a. Design principles for Solar energy utilization in the local context;
 - b. Solar access protection controls;
 - c. Administrative charts to enable an applicant to follow the progress of an application;
 - xi. Incorporate comment and finalize report on the selected solar access measure to be approved by Council;
 - xii. Following Council approval, set up personnel, application forms, publicity and other administrative arrangements for implementation.
2. CIRCULATION OF PRINCIPLES FOR COMMENT

Attachment 5 at the end of this section sets out the list of over 70 agencies which received a copy of the draft proposals for a solar access protection measure in Ottawa. It consists of external and internal agencies in respect of the municipality, the former involving regional, provincial and national agencies, the latter various relevant departments within City Hall.

The circulation procedure involved the remittance of the proposed draft with a request for comment by a certain date, followed with a meeting to derive maximum benefit from constructive comment provided by the agency. The diversity of the agencies involved - technical, legal, social, professional, educational, etc. - ensured balanced comment and a multi-disciplinary view of the proposal.

The circulation to relevant Committees of the municipal council is also important to ensure a thorough understanding of the proposed measure. In the City of Ottawa these comprised the Energy Advisory Committee, Planning Committee and City Council. The presentation to these bodies involved diagrams and models to explain the stipulations and impacts of the proposed solar access protection measure.

3. DAY-TO-DAY PROCEDURES FOR IMPLEMENTATION OF SOLAR ACCESS PROTECTION

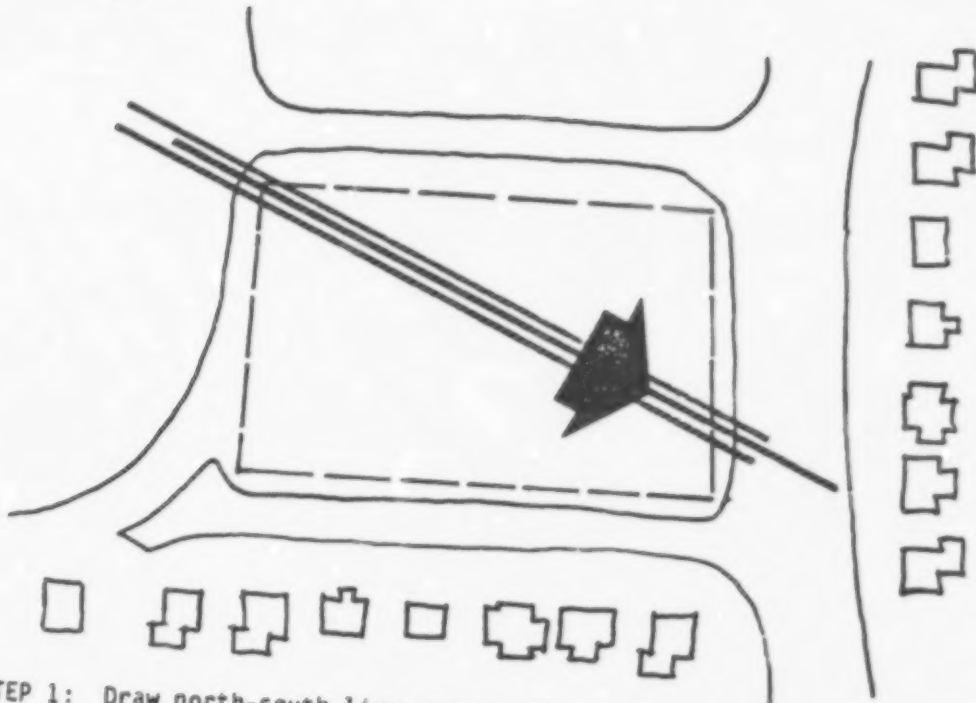
Section 3 of the attached SOLAR DESIGN GUIDELINES shows the administrative process charts determined in the light of the experimental application of solar access principles in Ottawa. These processes may be divided into four parts, as follows:-

- A. Application of solar access provisions as part of the Zoning or re-zoning process for land use (See example on following 7 pages).
- B. Application as part of Building Permit issue procedure.
- C. Application as part of Site Plan Control.
- D. Procedures established through the adoption of the GUIDELINES - i.e., procedures inherent in Solar Access Protection;

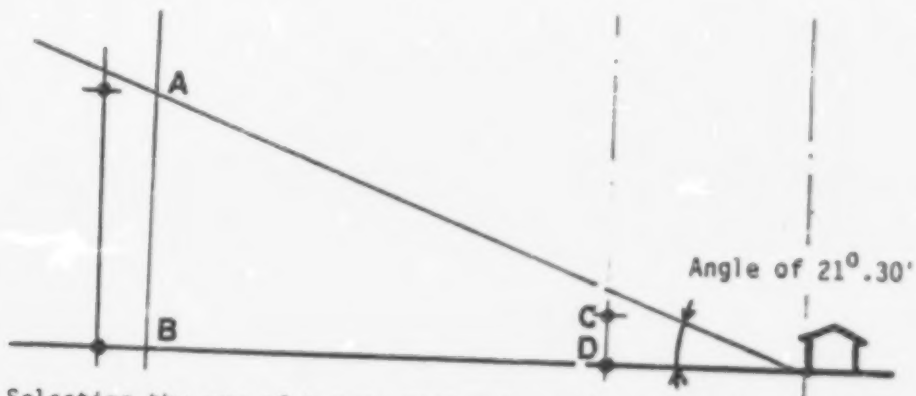
The total of 6 charts should be made an integral part of the measure established for solar access protection, to ensure maximum public awareness of all matters related to solar access.

AN EXAMPLE OF LAND USE ZONING FOR SOLAR ACCESS

Procedural steps in setting up the solar envelope for a site and translating it into zoning form.



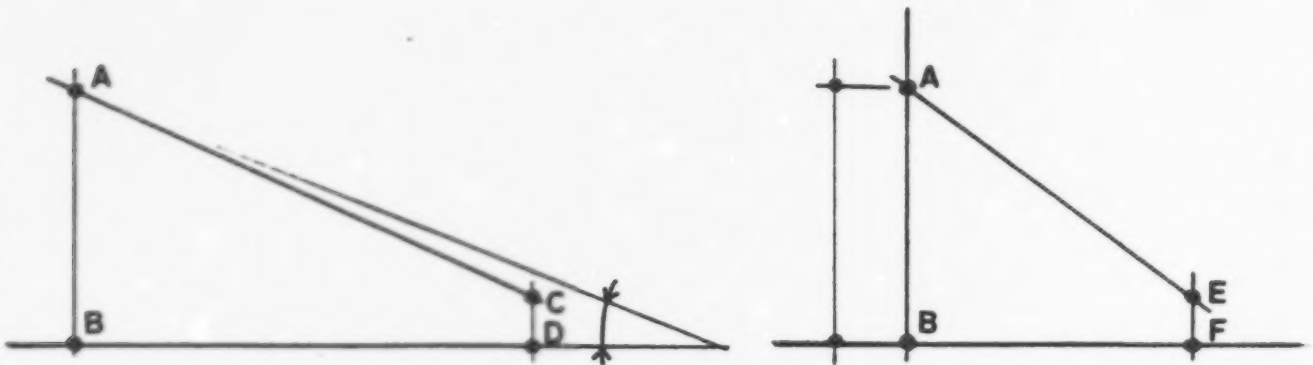
STEP 1: Draw north-south line across site starting from the corner furthest south. (If the site boundary runs east-west, start at midpoint on this boundary)



STEP 2: Selecting the row of houses most vulnerable to shading between 9 a.m. and 3 p.m. EST, allow for their 'protected garden' and draw an angle of $21^{\circ}.30'$.

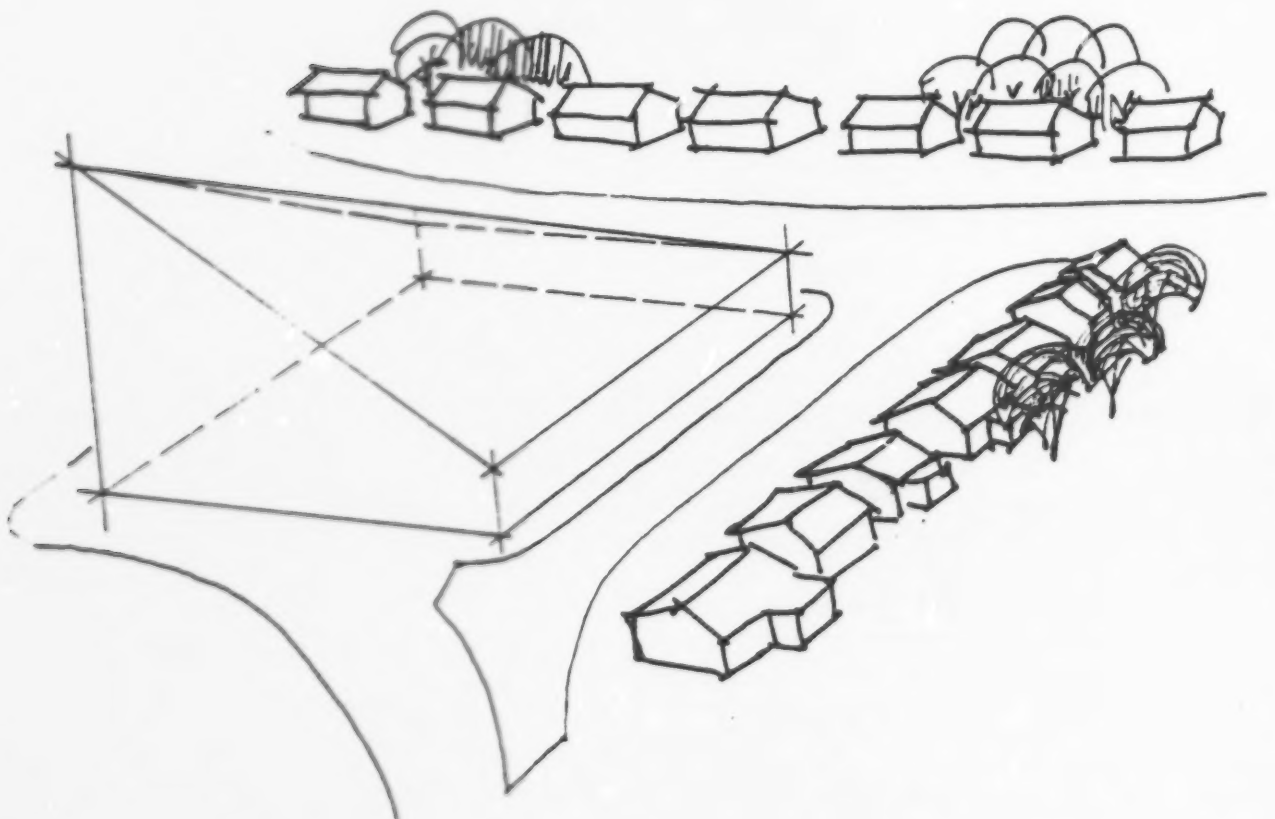
Project the southernmost corner or site boundary vertically to meet the line at $21^{\circ}.30'$. This will give the maximum permissible height for the site (AB).

Draw 8.00 m height at northernmost corner or site boundary (CD).

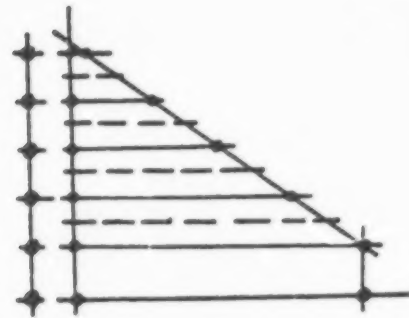
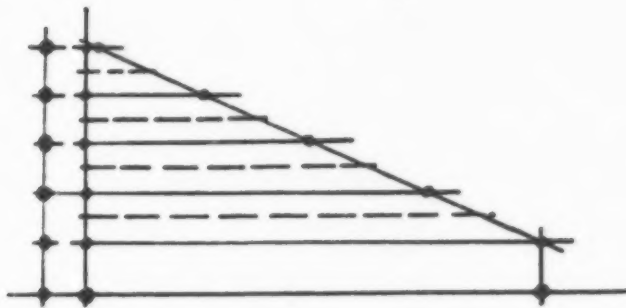


STEP 3: Join ABCD to produce east elevation of solar envelope.

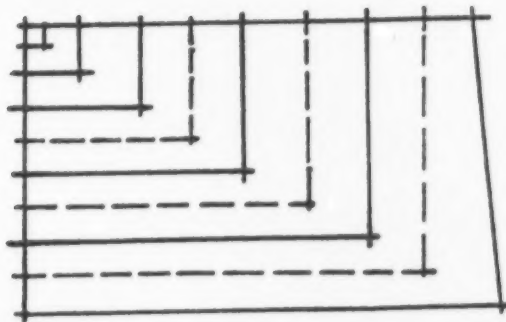
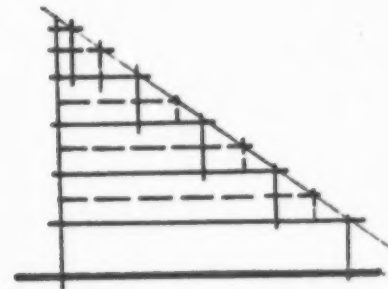
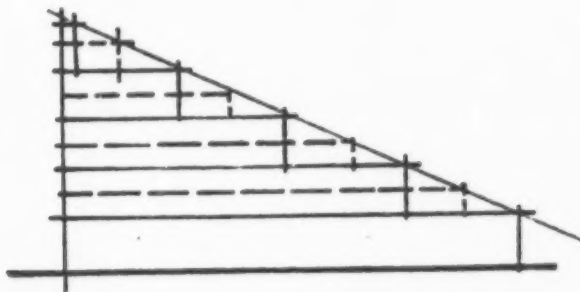
Draw maximum permissible height AB and 8.00 m height EF on easternmost corner or site boundary to produce south elevation of solar envelope ABEF



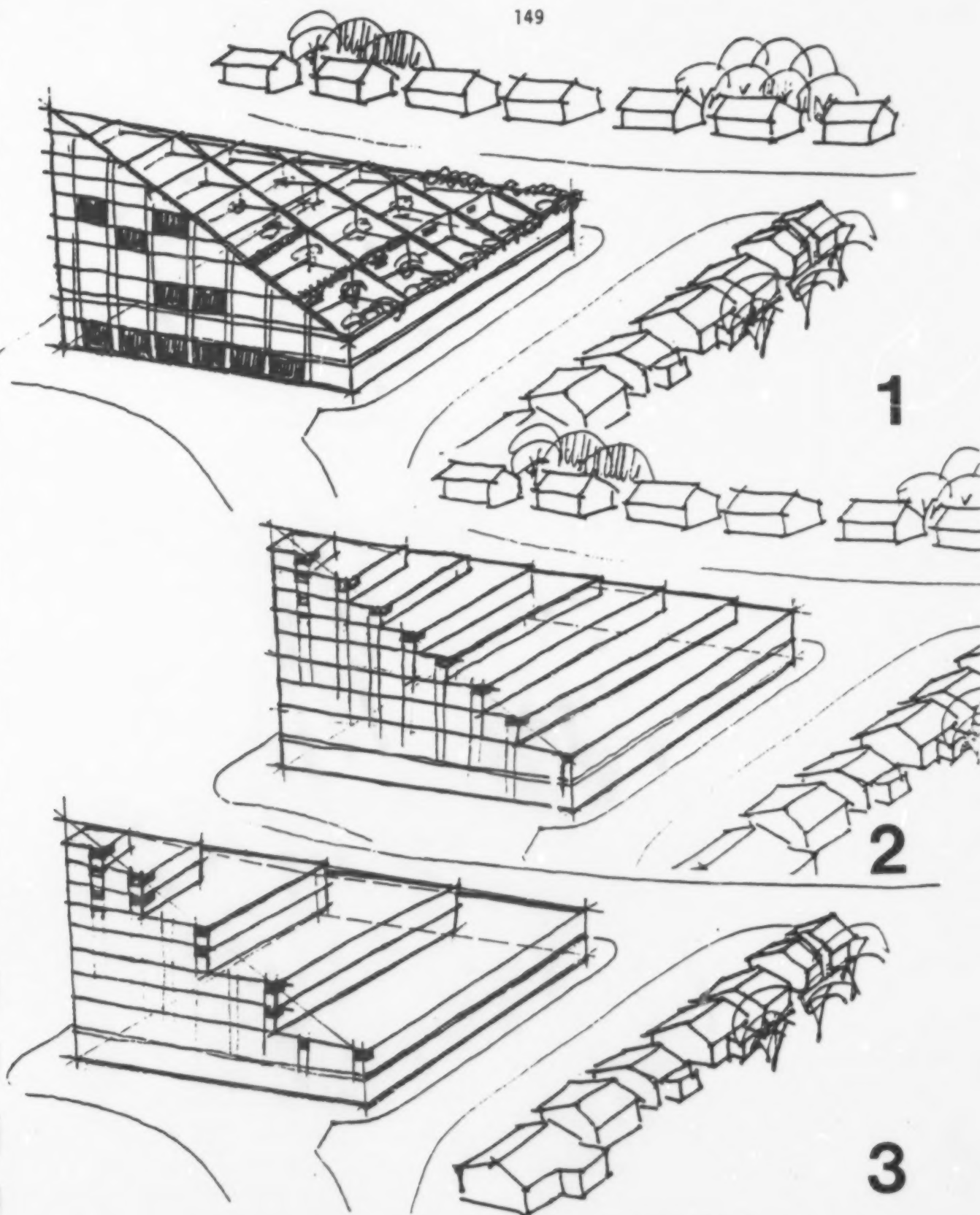
STEP 4: Draw 3-dimensional representation of solar envelope on site (perspective). This would be an acceptable building proposal.



STEP 5: Dissect solar envelope into 4.00 m or 8.00 m slices for zoning purposes.

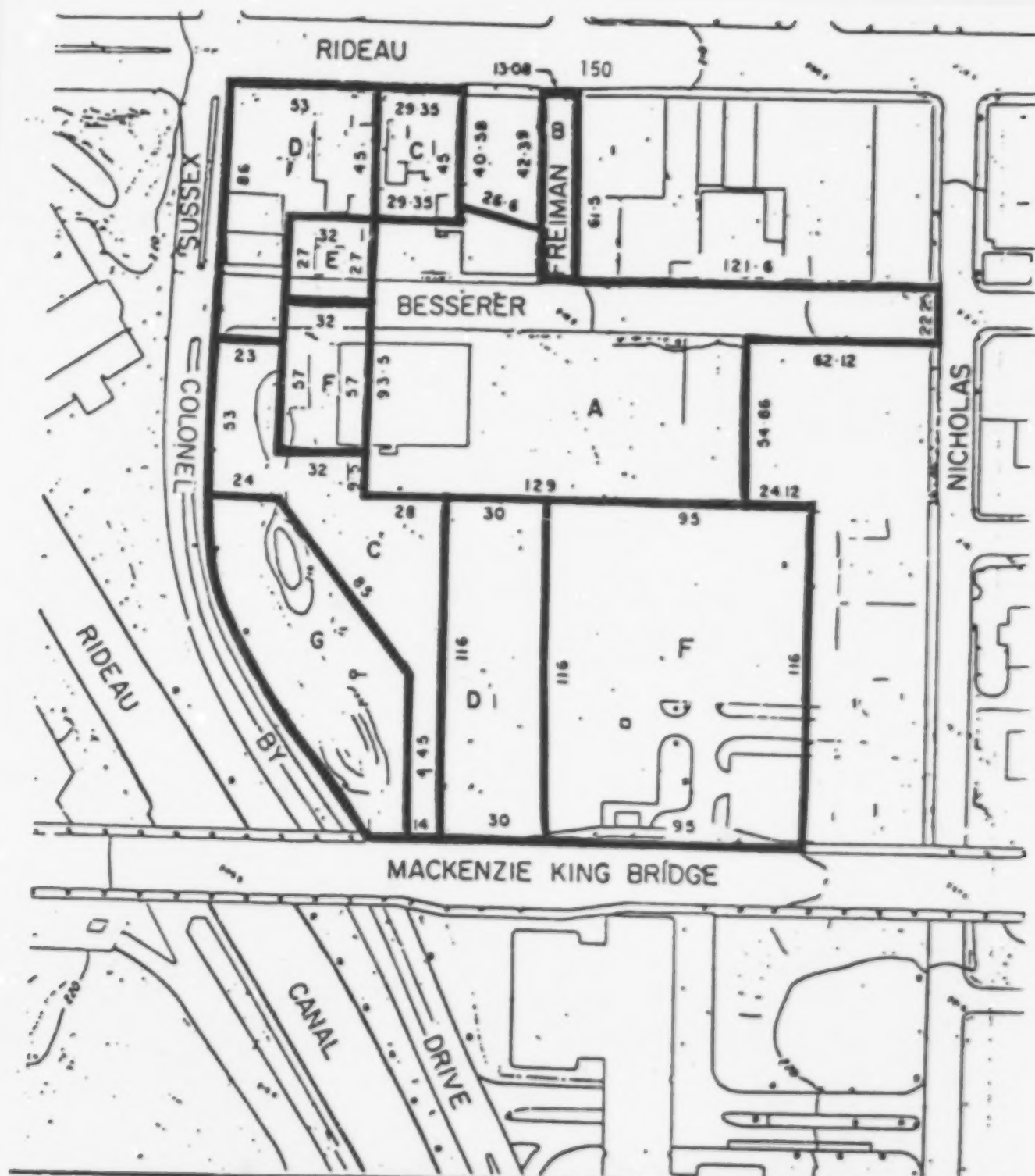


STEP 6: Convert solar envelope into a ziggurat form, in plan and elevations.
More practical option for building.



ALTERNATIVE BUILDING PROPOSALS FOR THE SITE CONSIDERED.

000102



THIS IS MAP "L." TO BY-LAW
NUMBER 208-80 PASSED THIS
18 DAY OF JUNE, 1980

ALL MEASUREMENTS IN METRIC UNITS

PLANNING BRANCH

DATE... JUNE 13, 1980

FILE NO. CD4490-79-29

DRAWN BY. D.B. PEGG

SCALE

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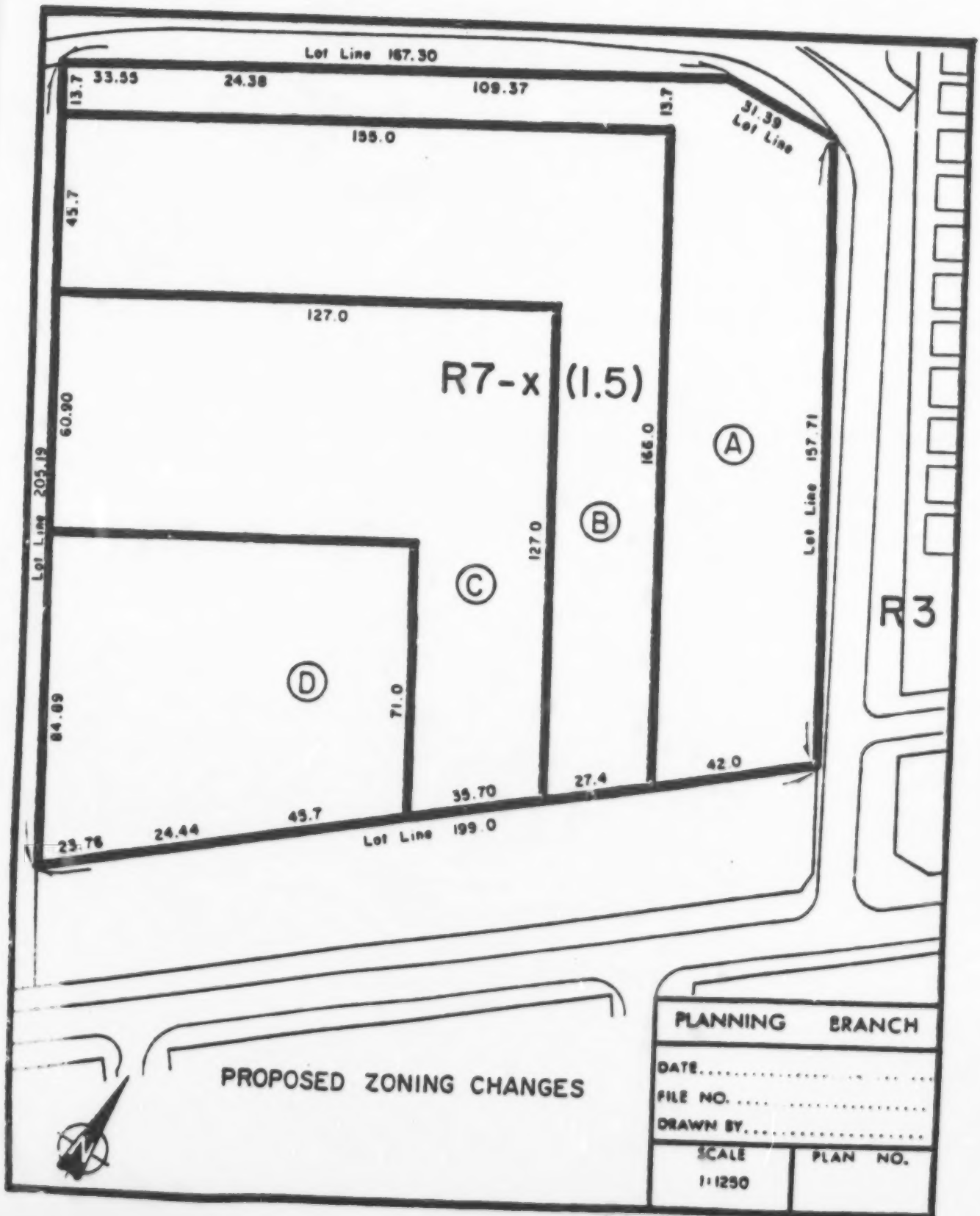
PLAN NO.

PB5K 2834

000193

ZONING PHRASEOLOGY SUGGESTEDFOR THE DESCRIPTION OF ABUILDING VOLUME TO PROTECTSOLAR ACCESS ON NEIGHBOURING PROPERTIES

- (I) for the block of land with the symbol "A" on Map "L" no part of any building shall extend above the angular plane extending from the southerly side of Rideau Street at a height of seventy-four and seven-tenths (74.7) metres above sea level to the southerly boundary of Block "A" at a height of one hundred forty-one (141.0) metres above sea level,
- *** (II) for the block of land with the symbol "B" on Map "L" no part of any building shall extend above the angular plane extending from the northerly boundary of Block "B" at a height of seventy-six point eight (76.8) metres above sea level to the southerly boundary of Block "B" at a height of one hundred and five point four (105.4) metres above sea level,***
- (III) for the blocks of land with the symbol "C" on Map "L" no part of any building shall extend above ninety-two (92.0) metres above sea level,
- (IV) for the blocks of land with the symbol "D" on Map "L" no part of any building shall extend above one hundred and one (101.0) metres above sea level,
- (V) for the block of land with the symbol "E" on Map "L" no part of any building shall extend above one hundred thirty-five (135.0) metres above sea level,
- (VI) for the blocks of land with the symbol "F" on Map "L" no part of any building shall extend above one hundred forty-one (141.0) metres above sea level,
- (VII) for the blocks of land with the symbol "G" on Map "L" no part of any building shall extend above eighty-two (82.0) metres above sea level.*



000195

CITY OF OTTAWA - VILLE D'OTTAWA

From: Community Development Department Date: January 13, 1984

De: Ref. No.: 0713-025/84 010040
N° de ref.:

Action Exécution	Information Pour votre gouverne	Ward Quartier
[X] Administrative administrative	[] Policy politique	[] City-wide

To/A:

[2] Ottawa Planning Committee Comité d'urbanisme d'Ottawa	Non-Profit Housing Logement à but non lucratif
[] Physical Environment Committee Comité de l'environnement	[] Executive Committee Comité exécutif
[] Admin., Policy and Priorities Committee Comité de l'adm., des politiques et des priorités	[] Board of Directors Conseil d'administration
[1] Other Energy Advisory Committee Autre	[3] City Council Conseil municipal

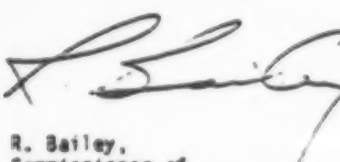
SUBJECT/OBJET

Solar Design Guidelines/Principes directeurs de la conception en fonction de l'énergie solaire. CD-164-6.

RECOMMENDATION

1. That the SOLAR DESIGN GUIDELINES shown in Attachment 1 be APPROVED as a voluntary conformance instrument;
2. That the list of designers, developers and householders who participated in the City's SOLAR DESIGN PIONEER programme for the experimental application of Model Solar Access By-law principles, be APPROVED for the award of the certificate for that programme (Attachment 2);
3. That there should be a review of the performance of the SOLAR DESIGN GUIDELINES after a year's application.
4. That this report be received and approved as the outcome of the Research Study undertaken for the Ontario Ministries of Energy and of Municipal Affairs and Housing and be forwarded to them in completion of the requirements of the Energy Conservation Through Land-Use Planning (ECTP) grant programme.

GA:cm-7
 010040
 17/08/83


 R. Bailey,
 Commissioner of
 Community Development.

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BACKGROUND

A brief account of the origins and development of the idea of solar access protection in Ottawa is given in Attachment 4. The Council approved an application to the Ontario Ministries of Energy and of Municipal Affairs and Housing in October 1981 and a grant of \$25,000 was obtained under the Energy Conservation Through Land-Use Planning (ECTP) program to develop (a) a set of principles and (b) a process, whereby a municipality with built-up areas, could protect solar access for all properties in them, by reliance on zoning powers, as granted under the amended Ontario Planning Act, 1980.

In January 1982, Planning Branch initiated the formation of citizen committees in Capital Ward and Westboro. The involvement of citizens in the formulation of solar access protection principles was considered essential, because of the large number of value judgements - on existing trees, heritage buildings and streetscape in general - which would be required in the process. The above-mentioned two committees developed two alternative legal approaches to solar access protection: -

- (a) Solar access as a property right; (developed by Capital Ward Committee)
- (b) Solar access protected through reliance on existing municipal powers in land use zoning. (developed by Westboro Committee)

The first alternative was considered to lie beyond the remit of the above-mentioned ECTP research programme and to be worth pursuing only if reliance on existing municipal powers failed to provide satisfactory solar access protection. The second alternative was developed as a set of principles for such protection by the Westboro Committee and following circulation to City Hall Departments, technical agencies and community leaders in the Ottawa-Carleton region, relevant Federal and Provincial Ministries, organizations and experts in Canada, they were slightly modified to reflect comments received. Subsequently, they were applied experimentally to test their feasibility in accordance with the criteria in Information Report No. 0713-233/83 to Ottawa Planning Board. The results of this application are given in Attachment 3.

OPTIONS

Enact a by-law which will impose compulsory provisions for the allowance of corridors free of building development, in order to ensure solar access to every property.

RATIONALE

The Recommendation that Solar Design Guidelines be approved for voluntary conformance is based on the clear and unmistakable indication by the results of the experimental application of Solar Access Principles (Attachment 3) that the majority of applicants for Site Plan Control and Building Permit already conformed to these Principles. There is little doubt that a definite trend has already been established by pioneering designers, developers and householders towards the incorporation of solar design features - large double-glazed windows, solar collector panels, solariums, sun decks, etc. - for the express purpose of solar energy utilization, amenity and the enjoyment of sunshine. A number of applicants had respected solar access corridors to neighbouring properties by pure chance. The distribution of a SOLAR DESIGN GUIDE for designers to conceive their project "with solar in mind" helped this number to increase significantly.

The adoption of Solar Design Guidelines for voluntary conformance by applicants for Site Plan Control or Building Permit, would have the following advantages in comparison with the enactment of a compulsory By-law on Solar Access Protection: -

- a. Conformance to the Council's Energy Conservation Policy for the City (Report 0713-162/81) which is based on persuasion, rather than compulsion, being the cornerstone of that Policy;

- b. Prior consultation to provide design advice at the inception stage of projects, rather than a retrospective application of criteria on submitted applications. This consultation would take the form of dissemination of the pamphlet SOLAR DESIGN GUIDELINES (Attachment 1) in the first instance and the provision of design advice across the Energy Conservation Counter at City Hall, in the second. In due course, it is hoped to provide a computerized design service, because the Ontario Ministry of Energy has already taken preliminary steps towards the production of software, to trace the 'solar envelope' for any site in Ottawa and in due course, the entire Province.
- c. Negotiation of Site Plan Control conditions with the applicant, rather than unilateral imposition of such conditions. A memorandum to Current Operations Staff and the Secretaries of the Design Committee and the Committee of Adjustment will stipulate the types of incentive to be offered to applicants, in return for solar access protection to neighbouring properties.
- d. Lighter administrative load, than in the case of a By-law which would have to be applied to all incoming applications for Site Plan Control or Building Permit.

An important disadvantage of the recommended approach is that it is not based on a legislative framework to ensure solar access protection. As a remedy however, the Ministry of Municipal Affairs and Housing recommends the following two actions as part of implementation:-

- (a) Referring this Report to the group responsible for Official Plan preparation to enable land-use related energy conservation policies to be considered,
- (b) Maintaining public awareness on solar access protection principles through CONSERVATION PIPELINE articles in 'The Citizen' and 'Le Droit'.

Both these actions would be a logical sequel to the Council's approval of the proposed SOLAR DESIGN GUIDELINES.

INPUT FROM OTHER SOURCES

N/A

ATTACHMENTS

- 1. SOLAR DESIGN GUIDELINES.
- 2. SOLAR DESIGN PIONEER programme.
- 3. Experimental application of Model Solar Access By-law Principles.
- 4. The origins and development of Solar Access Protection Principles in Ottawa.

COMMUNITY NOTIFICATION

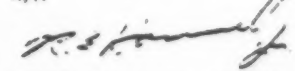
N/A

DISPOSITION

N/A

FINANCIAL COMMENT

N/A


Commissioner of Finance.

KEH:crb

CITY OF OTTAWA
Community Development Department

SOLAR DESIGN GUIDELINES

000203

The contents and observations expressed in this report are those of the author, and are not necessarily those of the Corporation of the City of Ottawa.

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SOLAR DESIGN GUIDELINES

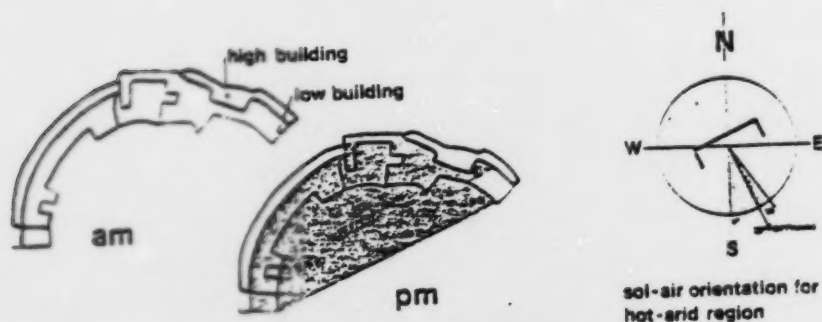
INTRODUCTION

All people feel a basic need for sunlight and one of the sunniest climates in Canada is to be enjoyed in the National Capital, Ottawa. With nearly 2000 hours of bright sunshine a year - a higher annual average than many holiday regions in the country - architects, developers and ordinary householders wishing to improve their property, could not remain indifferent to the benefits of solar energy.

This booklet provides some basic information on the design of various solar features to allow the penetration of sunlight where and when needed in and around a building and to the neighbouring properties. In an increasingly energy-conscious world, this allowance of opportunities to all property owners to exploit solar energy at some point in time, is the only fair and civilized approach to urban development.

The criteria set out in these GUIDELINES will be among the various considerations applied to development proposals by Planning (Land-Use and Development) and Buildings Branch and by the Committees of Adjustment, Design and Planning. Preliminary advice on any part of this booklet may be obtained at the Energy Advice Counter at City Hall (7th floor) or by calling:-

THE CITY ENERGY PLANNER: 563-3000.



PLAN OF PUEBLO BONITO, Chaco Canyon, New Mexico

Morning reception and afternoon control of solar energy, illustrates the use of sol-air orientation by the Pueblo Indians (919 AD) at the scale of an entire settlement.

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S E C T I O N 1

SOLAR ENERGY UTILIZATION

People have been using solar energy from times immemorial, but only in crude and rather uneducated ways - sunbathing for hours on end, for example, regardless of the risk to health from skin cancer. The development of high technology and nowadays, the feasibility of minute measurements through microcomputers, allows greater scope for creative experimentation and comparison of various shapes and materials, to capture and use SOLAR ENERGY*.

This Section of the GUIDELINES explains briefly the present state of the art in solar energy utilization, defining the acceptable forms of such utilization for the protection of SOLAR ACCESS to a property and allowing scope for further experimentation. It is divided into the following parts:-

- a. Principles of solar energy utilization;
- b. Geometry for optimum utilization at Latitude 45° 29'N (Ottawa);
- c. Basic vocabulary of solar design features in buildings;
- d. Scope for further experimentation.

The emphasis throughout this Section is on optimal use of solar energy for domestic buildings, but many aspects will be found to be applicable to other types of buildings as well.

a. Principles of Solar Energy Utilization

It has been estimated that the quantity of solar energy received from the sun amounts to 30,000 times the total supplied by other sources to mankind (Lönnroth, 1977). The reason for the indifference to such a vast source is that solar energy is low in intensity and requires rather sophisticated HEAT STORAGE methods, which unfortunately have been lagging behind.

Note: * All terms written in capitals and underlined are explained in greater detail in the DEFINITIONS on p. 34.

000207

The low intensity heat received from the sun, however - a mere 1.3 megajoules/sq. metre or 116 BTU per square foot of the earth, each hour, after allowing for various losses for passage through the atmosphere - is particularly suitable for domestic uses. For purposes of these GUIDELINES, there are five acceptable uses of this energy, for which solar access protection to neighbouring properties to a proposed development will be considered, in accordance with provisions set out in Section 2:-

1. Growing food;
2. Sunbathing;
3. Heating fluids - i.e. air and water;
4. Cooling fluids.
5. Converting solar energy into electric current or other forms of usable energy.

All of these uses depend on the effects of solar energy on plants, people, objects and fluids. The biological effects on plants and people fall outside the scope of solar design guidelines - suffice it to mention that temperature and radiation extremes are harmful to both. The effect on material objects and fluids is to heat them by the processes of CONDUCTION, CONVECTION and RADIATION.

SOLAR DESIGN is essentially the imaginative use of materials to control the reception of solar energy - in terms of light, heat and radiation - by managing the processes of conduction, convection and radiation. One of the most useful means for this management was discovered by the Swiss naturalist, Horace de Saussure, in 1767 and it still remains the most frequently employed means by all designers - the 'greenhouse effect'. Experimenting with insulated boxes of wood, covered with two and subsequently three layers of glass, he obtained temperatures of 110°C - i.e. well above the boiling point of water. The GREENHOUSE EFFECT involves:-

- i. Absorption of radiated solar energy through a transparent material and conversion to heat;
- ii. Conduction of heat to adjacent air or other fluid;
- iii. Convection of air, spreading the accumulated heat; and
- iv. Storage of heated air by means of insulation, in the form of:-
 - (a) a layer of air between two or three panes of transparent material on the sunny side(s); and
 - (b) insulating material on the other side(s) of the greenhouse 'box';
- v. Accumulation of carbon dioxide in the air, if plants are present in the absence of sunlight.

The crucial role of insulation in bringing about and subsequently reinforcing the 'greenhouse effect', should never be underestimated. A well-designed solarium on the south side of a badly insulated house, for example, will never make up for the deficiency in insulation. Design Committee will therefore require sufficient construction details, to ensure the provision of adequate insulation, in walls defining the spaces for which solar design features have been proposed. The accumulation of carbon dioxide in a greenhouse is a factor to be considered when planning the location of bedrooms. The passage of air from a greenhouse to a bedroom may be welcome during the day, but it should be avoided at night.

The greenhouse effect is the means employed in ACTIVE as well as PASSIVE solar collector systems:-

An ACTIVE SOLAR SYSTEM collects, transmits and stores solar energy as usable heat, by reliance on mechanical means or a chemical process - e.g. a mechanical fan or pump to circulate air or water heated through the greenhouse effect, created in a solar collector panel.

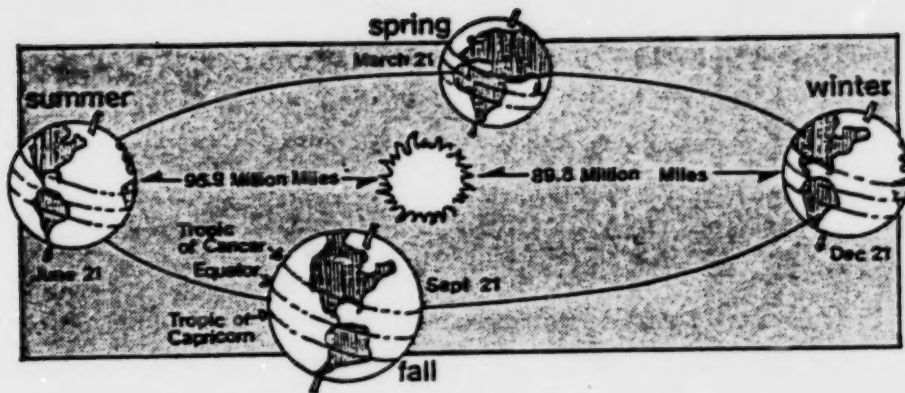
A PASSIVE SOLAR SYSTEM, on the other hand, collects and stores the heat accumulated through the greenhouse effect created by, say, a window, into the massive parts of a structure - concrete walls and floor slab, metal furniture or barrels of water - and subsequently releases it to surrounding fluids - air or water - through conduction and convection. Occasional assistance by a mechanical device to reinforce these processes may be used.

Both active and passive solar systems often need to have some heat storage capacity to be effective. This has proved to be the most formidable stumbling block to the progress of solar technology. Warming water or air under the sun has been used to collect solar energy from times immemorial, but how to keep them warm after sunset has proved very difficult. At present, a day and a half is about the maximum storage period and allowance for experimentation to prolong this period will be made in part (d) of this Section.

For purposes of these GUIDELINES, a solar collector will therefore be expected to carry out the functions of collecting and storing heat, by active or passive means, in order to be acceptable for solar access protection purposes under Section 2. A more complete definition of such a collector will be found in Part (c) of this Section.

b. Geometry for the Optimum Utilization of Solar Energy
At Latitude 45°29'N (Ottawa)

Every latitude on earth imposes a particular geometry for the optimum utilization of solar energy. The reason is that the angle at which solar radiation is received on earth is a more important factor for the collection of energy than the distance between sun and earth. This is evident in the seasonal variation of heat received on the earth. (Diag. 1)



Diag. 1: SEASONAL VARIATION OF THE EARTH'S TILT AND DISTANCE TO THE SUN, DURING THE YEAR.

A location on the Tropic of Cancer, for example, receives more radiation in summer than a location on the Equator at the same time, despite the fact that the distance between earth and sun is 6.1 million miles more than when it is winter on the Tropic of Cancer.

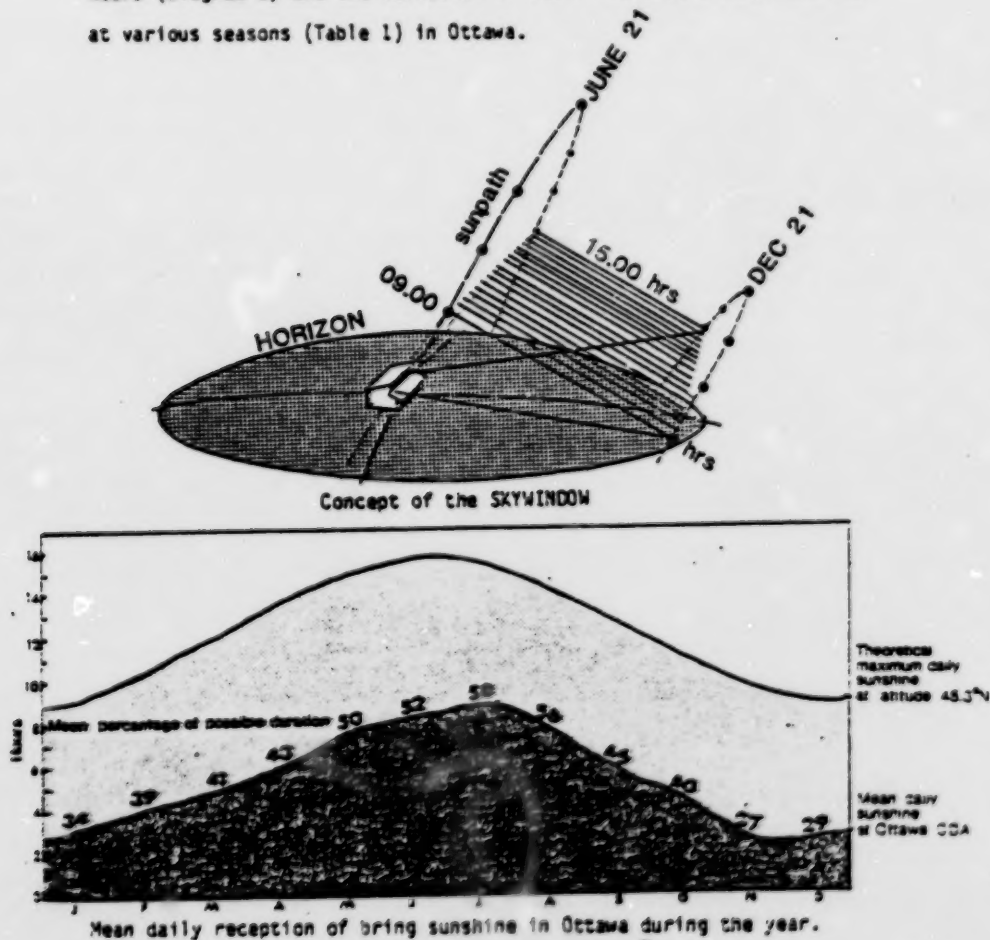
The angles of sunlight reception at any location in the northern hemisphere have been illustrated in many publications - see National Research Council (1967, 1982) and City of Hamilton (1982) among others in REFERENCES.

Diag. 2 shows the concept of the SKYWINDOW, which should theoretically be available at any point on the northern hemisphere for the utilization of solar energy. This window is formed by the highest and lowest sunpaths in the year (June 21st and December 21st respectively) defining the horizontal limits for the reception of useful sunshine and 9:00 a.m. to 3:00 p.m. - the middle best of the day, to receive the highest intensity of sunlight - defining the vertical ones. The second part of Diag. 2 shows that even without considerations of obstruction by buildings or trees, the cloud and other weather factors affecting a particular location like Ottawa, allow only a percentage of the theoretical maximum of sunshine available through the skywindow for utilization.

The most advantageous angle of reception for the collection of solar energy is naturally 90° - i.e. when the rays hit a collector surface as perpendiculars. This may not, however, be the optimum angle for other domestic purposes like growing plants or sunbathing. It would therefore be worthwhile to define the acceptable angles of solar radiation reception for purposes of these GUIDELINES:-

1. For solar collectors and converters (PHOTOVOLTAIC CELL panels).

Whenever it appears financially viable, designers may consider tracking mechanisms which may rotate or tilt the collector to face the sun always at 90° . If only rotation is allowed for, the tilt should be fixed at 60° or, more precisely, $60^\circ.29'$, in accordance with the formula:- 'Latitude + 15° ' to allow for the mean of daily sunshine hours (Diagram 2) and the variation of solar altitude through the day at various seasons (Table 1) in Ottawa.



Diag. 2: CONCEPT OF THE SKYWINDOW AND RECEPTION OF SUNSHINE IN OTTAWA.

000212

Table 1: SEASONAL AND DIURNAL VARIATION OF SOLAR ALTITUDE IN OTTAWA (LATITUDE: $45^{\circ}.29'$ N)

TIME	AZIMUTH	ALTITUDE	SEASON
Noon	$180^{\circ}.0'$	$21^{\circ}.30'$	Winter
9:00 am/3:00 pm	$139^{\circ}.0'$	$10^{\circ}.0'$	
7:40 am/4:20 pm	$124^{\circ}.30'$	$0^{\circ}.0'$	
Noon	$180^{\circ}.0'$	$45^{\circ}.0'$	Fall and Spring
10:00 am/2:00 pm	$141^{\circ}.0'$	$38^{\circ}.0'$	
8:00 am/4:00 pm	$112^{\circ}.0'$	$20^{\circ}.30'$	
6:00 am/6:00 pm	$90^{\circ}.0'$	$0^{\circ}.0'$	
Noon	$180^{\circ}.0'$	$68^{\circ}.30'$	Summer
11:00 am/1:00 pm	$145^{\circ}.30'$	$65^{\circ}.30'$	
10:00 am/2:00 pm	$121^{\circ}.30'$	$57^{\circ}.30'$	
8:00 am/4:00 pm	$93^{\circ}.0'$	$37^{\circ}.30'$	
4:20 am/7:40 pm	$55^{\circ}.30'$	$0^{\circ}.0'$	

If only tilting is allowed for, then the collector may be fixed in a direction that will collect the optimum percentage of solar radiation shown on Table 2, for the space enclosed:-

Table 2: DIURNAL VARIATION OF SOLAR ENERGY RECEPTION IN OTTAWA (APPROXIMATE LATITUDE: 45°)

TIME	% RADIATION*				EXAMPLE-
09:00			10.7	....	Breakfast Room
10:00			14.4	....	
11:00			15.8	....	
12:00			16.2	....	Greenhouse
13:00			15.8	....	
14:00			14.4	....	Solarium
15:00			10.7	....	Living Room

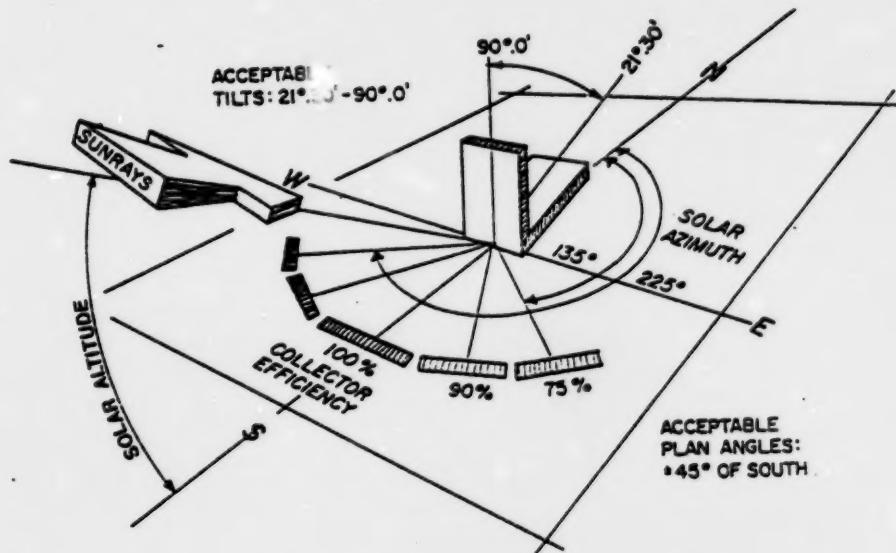
NOTES: * This figure represents the percentage of total radiation available during that day.

+ This example indicates the type of enclosed space for which the energy received may be adequate.

Table 3: NET ANNUAL HEAT GAIN THROUGH GLAZED SURFACES IN OTTAWA (MJ/SQ. M) FACING PROFITABLE DIRECTIONS

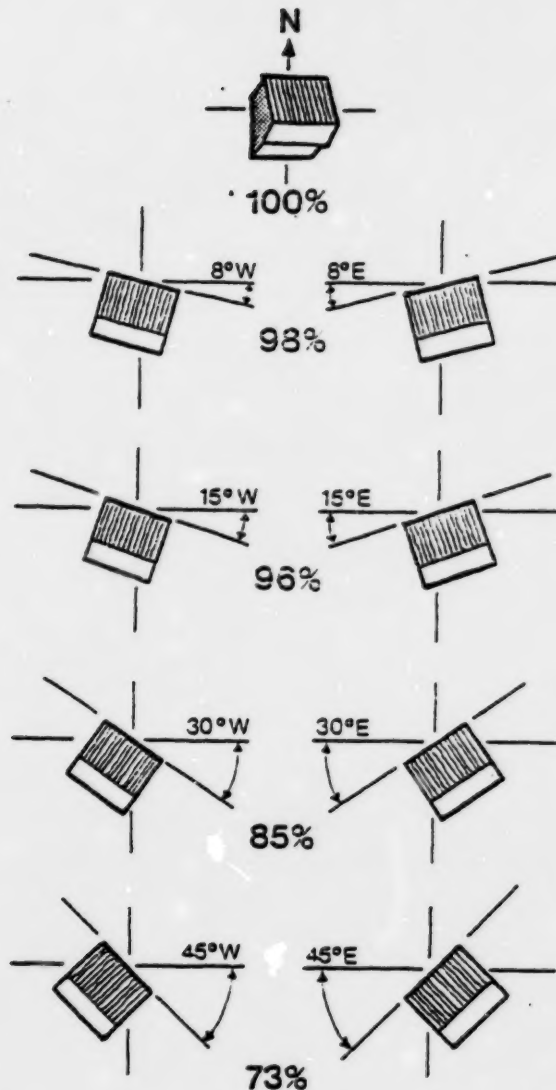
GLAZING	SOUTHEAST	SOUTH	SOUTHWEST
Single	-688	-426	-730
Double	+351	+585	+314
Triple	+641	+857	+607

NOTE: The percentage of solar radiation available outside the six hours indicated in Table 2 is almost negligible and not worth designing for. This implies that solar collector surfaces facing the sun at other than the profitable directions from southeast through south to southwest (Azimuth less than 135° or more than 225° - see Diagram 3) collect little or no solar energy and, in fact, they may cause the loss of more energy than they gain during the 24-hour cycle. Such surfaces will not therefore be acceptable for solar access protection purposes as provided for in Section 2. Similarly, surfaces tilted at an angle of less than $21^{\circ}.30'$ to the horizontal (see Winter Noon Altitude on Table 1) will also be unacceptable - horizontal skylights, for example.



Diag. 3: ACCEPTABLE ANGLES OF SOLAR COLLECTOR PLACEMENT IN OTTAWA.

In conclusion, surfaces designed to collect solar energy should (a) face south at 90° and not less than 45° ; and (b) they may be vertical or tilted not less than $21^{\circ}30'$ to the horizontal, in order to be acceptable for solar access protection under these GUIDELINES. The best means of obtaining these acceptable angles on a building is through ORIENTATION in accordance with the HANDBOOK for ENERGY EFFICIENT RESIDENTIAL SUBDIVISION PLANNING issued by the Ontario Ministry of Municipal Affairs and Housing, 1982. Diagram 4, reproduced from this Handbook, exemplifies the approach. For maximum comfort, designers may also consider the Ottawa SOL-AIR ORIENTATION of 12° South of West, or azimuth 168° , as explained by Olgyay (1963) and shown in Diag. 6. Other useful hints will also be found in the SOLARIUM WORKBOOK and the SOLARIUM PRIMER issued by the National Research Council.



A range of orientations from due south are possible while still providing excellent solar exposure. Dwellings can be oriented 15 degrees east or west of due south without significantly reducing the potential for solar heat gain. When sited 30 degrees off due south, the loss of potential direct solar radiation amounts to about 15 percent. Solar gains are progressively reduced as dwellings are shifted further away from due south.

As a general rule, an orientation slightly east of south is the preferred one for solar gain. This orientation increases solar radiation in the morning when the ambient temperatures are lower, and reduces radiation in the afternoon when the outside temperature has risen.

Given the range of possibilities, however, the best orientation on a particular site may depend on local conditions. In areas with morning mist, for example, a building orientation slightly further to the west may be preferred because the early morning sun is obscured.

Direct solar radiation gain (which is one component of the net heat load calculation) diminishes as house is oriented away from due south.

Diag. 4: DIRECT SOLAR RADIATION GAIN FOR VARIOUS BUILDING ORIENTATIONS
(Reproduced from: HANDBOOK FOR ENERGY-EFFICIENT RESIDENTIAL
SUBDIVISION PLANNING).

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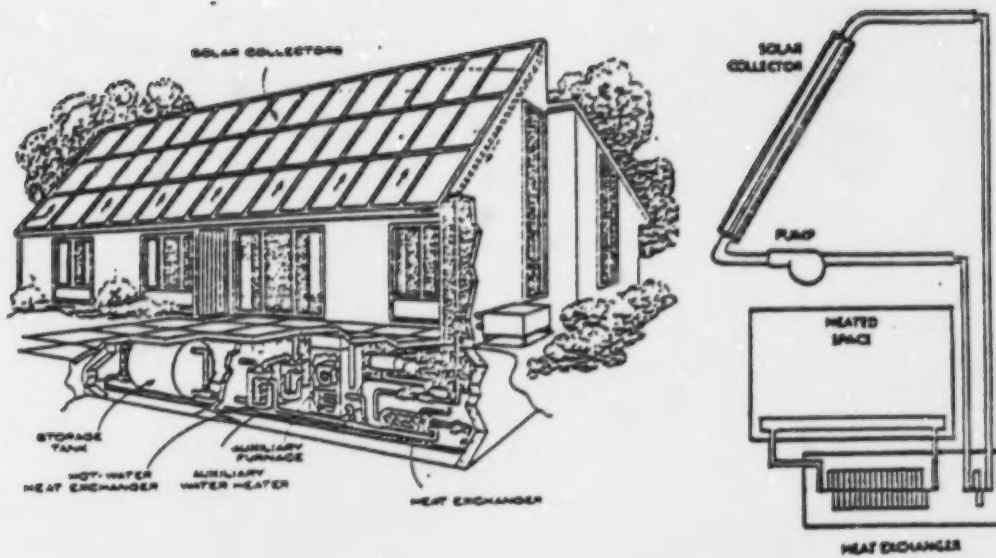
2. For solarium, breakfast rooms, or other spaces in which the main activity to be accommodated is relaxation or sunbathing, designers may consider angles other than the ones stipulated above, in accordance with the temperature and radiation conditions desired in a particular space. The orientation of a solarium, for example, need not be south or even southeast or southwest. On the other hand, a north orientation would be absurd. Although designers are free to incorporate large glazed surfaces in any direction from west, through north, to east - for the sake of a view from a house, for example - any expectation of solar access protection would clearly make no sense. Objections to a development proposal in these directions in the vicinity of such a house will not therefore be considered by the Committees.

c. Basic Vocabulary of Solar Design

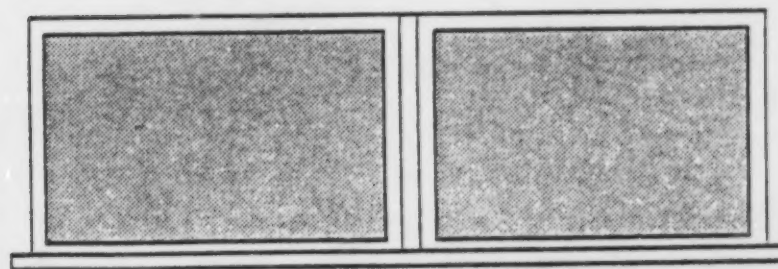
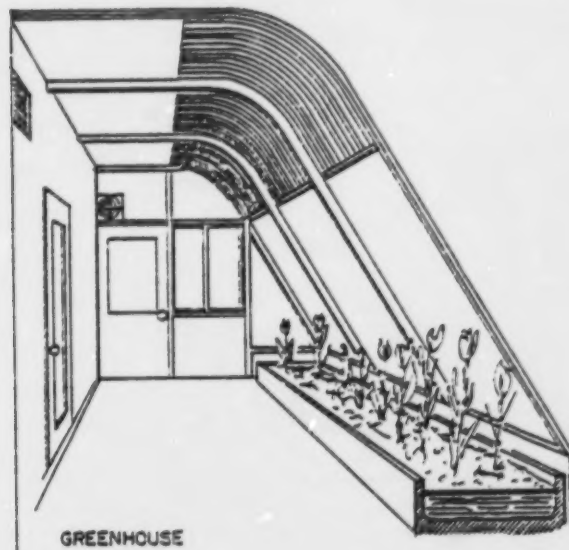
As already indicated under the Principles of Solar Energy Utilization, the most frequently employed means of collecting solar energy is by reliance on the 'greenhouse effect'. It is important to bear in mind that the greenhouse effect collects only heat, which is barely 16% of the energy received from the sun. The remaining 84% is light and the most advanced means of using this part of solar energy - photovoltaic cells - do not convert it to heat, but to electric current. The exposure requirements for a panel of photovoltaic cells are identical to those of a solar collector. Following discussion of the geometry of solar design for optimum utilization of solar energy in Ottawa, a general definition of a SOLAR COLLECTOR may now be given for purposes of these GUIDELINES, as follows:-

SOLAR COLLECTOR: A material surface exposed to sunlight at azimuths between 135° and 225° ; tilted to face the sun at any angle between $21^{\circ}.30'$ and $90^{\circ}.0'$ to the horizontal; and measuring at least 60 x 60 cm or 3600 square centimetres in area, to form the cover to an enclosure, in which by passive or active means, it collects a useful form of energy.

In addition to solar collector and photovoltaic cell panels, this definition covers large double- or triple-glazed windows, greenhouses, solariums, enclosed balconies, 'scoops' and any other enclosures in which the greenhouse effect is created, or sunlight is converted to some useful form of energy (Diagram 5). The 'solar collector', as defined above, may be used for space and water heating or cooling, by the use of a variety of circulation media, ranging from water and antifreeze mixtures to freon gas. In the case of relaxation spaces, the glazing exposed to the sun need not be double-glazed and a variety of filters or screens may be used to control the amount of solar radiation admitted into a space (Diagram 6). The vocabulary of solar design includes also external spaces designed for the purpose of relaxation and the enjoyment of sunshine (Diagram 7). It is important to emphasize that solar access protection to these spaces may be ensured either by including them in the 'solar envelope' of a property (See Diag. 9) or by incorporating them in the 'protected garden' (See Diag. 11) of that property.



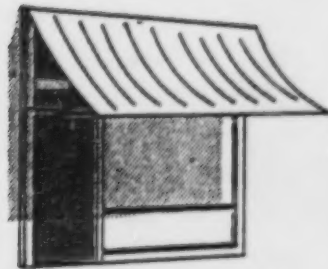
SOLAR PANEL



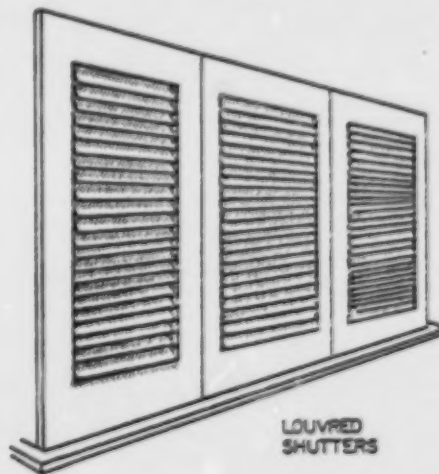
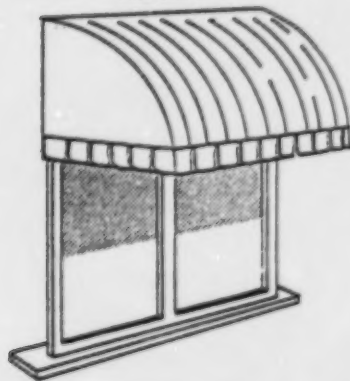
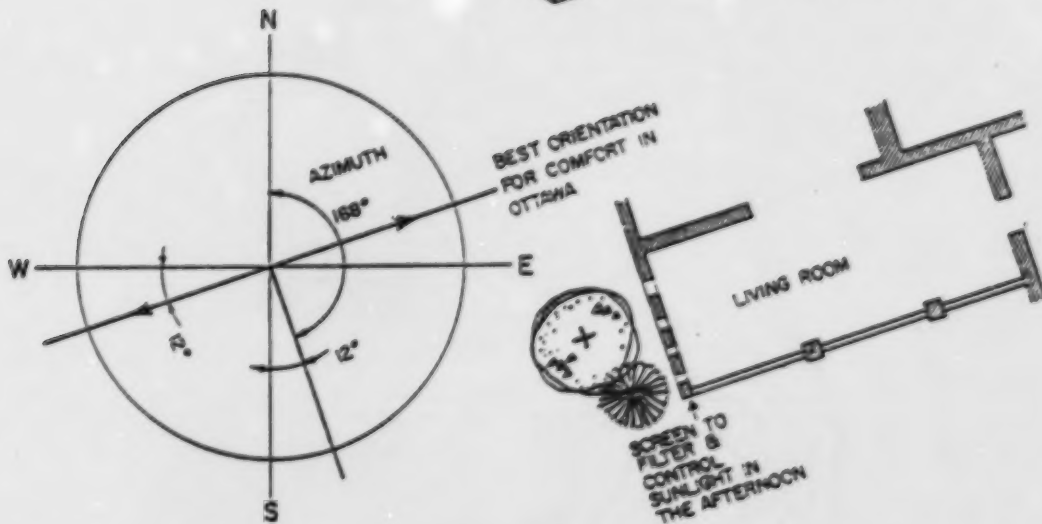
LARGE WINDOW

Diag. 5: EXAMPLES OF SOLAR COLLECTORS.

000218

CANVAS
AWNINGS

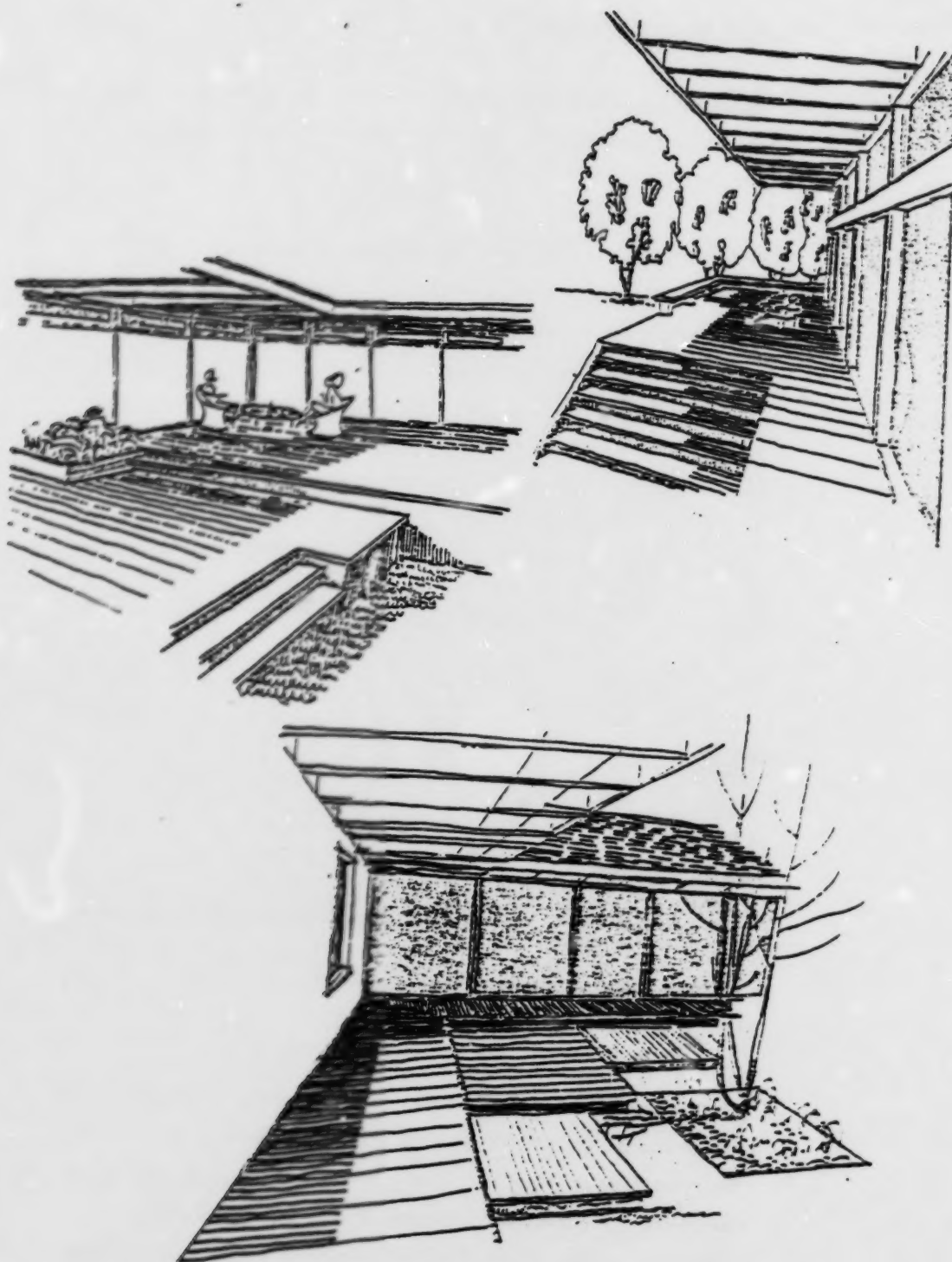
BAMBOO SCREEN

LOUVRED
SHUTTERS

Note: The SOL-AIR ORIENTATION ensures comfort by the absorption of solar energy in the morning and the control of solar radiation in the afternoon hours, if a screen is incorporated.

Diag. 6: SCREENS FOR SOLAR RADIATION CONTROL AND SOL-AIR ORIENTATION FOR OTTAWA

000213



Diag. 7: EXAMPLES OF EXTERNAL SPACE DESIGNED FOR THE ENJOYMENT OF SUNSHINE.

000220

d. Scope for Further Experimentation

Nothing in these GUIDELINES should inhibit designers from experimenting with novel shapes and materials to help extend the basic vocabulary of solar design.

As indicated in Part (a) above, the greatest scope for advancement is to be found in solar energy storage methods. A reservoir of water, thoroughly insulated and sealed may provide 1 1/2 day's storage, which is not sufficient to last over the 17 days of the longest cold spell occurring in January in Ottawa (Diag. 8). An alternative is the use of EUTECTIC SUBSTANCES like hydrates of salt, which according to experiments, if stored in a reservoir of 125 gallons in an insulated basement of a house, could extend the heat storage period to 5 or 6 months. Some eutectic salts however - e.g., Glauber's salt - have been found to have limitations in the number of times they will convert from solid to liquid state, to store heat.



Cold spells lasting for less than the above number of consecutive days

Diag. 8: DURATION OF COLD SPELLS IN OTTAWA.

A further area of experimentation is the modification of sunshine intensity through screens of variable mesh, to provide a measure of control. The proper location of any screen is on the outside of a glass pane - as in the case of the traditional louvered shutter - in order to prevent the accumulation of heat inside. Reflective materials may be used as screens, to help minimize the absorption of heat in summer.

000221

S E C T I O N 2

SOLAR ACCESS PROTECTION

If property owners in the City are to be encouraged to invest in solar energy exploitation, evidently their right to receive and enjoy sunshine on their property for a viable number of hours must be protected. Solar access protection on a particular lot implies the following types of control:

1. Control on the shape and volume of building development on the neighbouring lots;
2. Control on site coverage on all lots;
3. Control on the extent and duration of shade by signs, accessory buildings, fences and vegetation located on neighbouring lots.

THE FOLLOWING ARE GUIDELINES FOR THE EXERCISE OF THESE CONTROLS BY APPLICANTS AND THEY CONSIST OF A DEFINITION OF KEY TERMS, PRINCIPLES AND METHODS OF APPLICATION.

1&2 CONTROLS ON BUILDING SHAPE, VOLUME AND COVERAGE

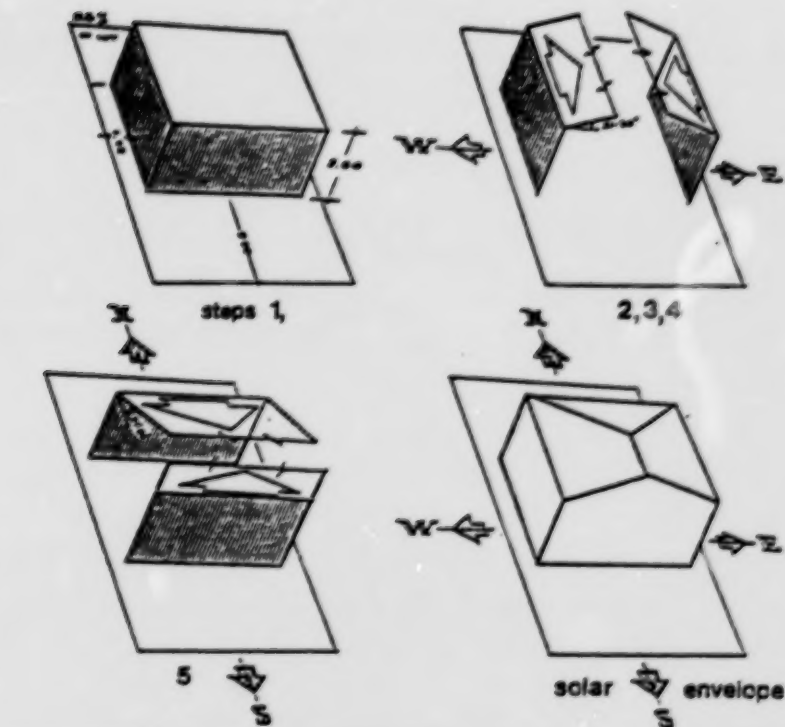
In order to protect solar access to neighbouring properties, the shape, volume and lot coverage of proposed development should be designed in accordance with the SOLAR ENVELOPE, as explained below.

A. Definition and procedure for drawing the SOLAR ENVELOPE for a site

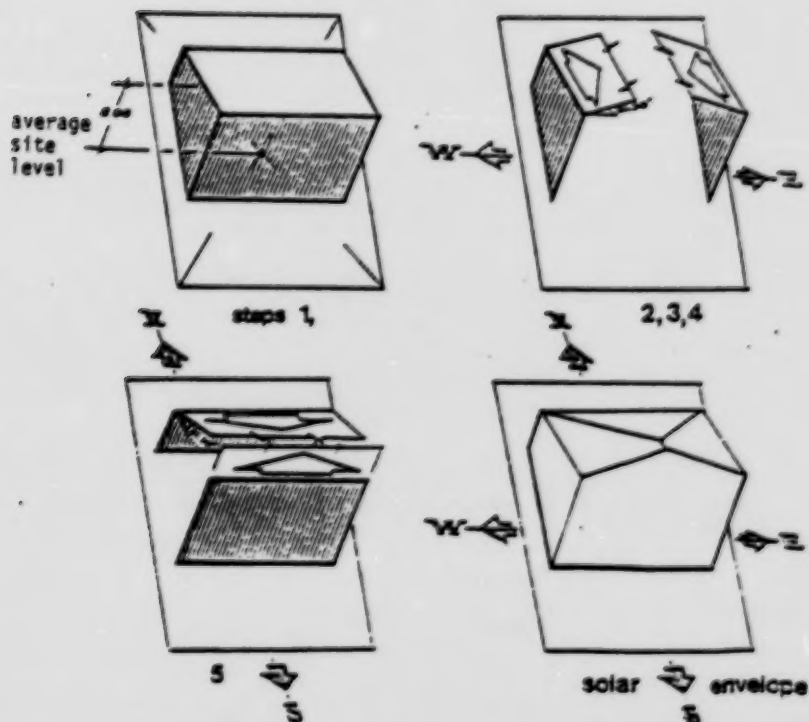
The 'building envelope' defined in AZ-54, to contain the maximum development permissible on a lot, may be drawn by marking the vertical planes along the front, side and rear setbacks and assuming a horizontal ceiling of development at the maximum building height permissible in a particular zone. This 'building envelope' may be modified to become a SOLAR ENVELOPE, as follows:-

- i. A maximum eaves height should be assumed at 8.00 m above average ground level in any lot (see Step 1 for level and sloping sites on Diagram). The objective of this height is to avoid casting shade on buildings across a street or across back gardens.
- ii. Along the east, west and north sides of the lot, the ceiling of development should be sloped at an angle of $21^{\circ}30'$ with the horizontal, to extend from the above-mentioned maximum eaves line to the centre of the lot, to intersect with the horizontal plane at maximum permissible building height (Steps 2, 3, 4). The objective of the slopes on the ceiling of development is to maximize the penetration of sunshine in built-up areas.
- iii. Along the south side of the lot, the vertical plane along the setback line should be extended upwards to meet the sloped ceiling of development and the horizontal plane at maximum permissible building height. (Step 5).

CONSTRUCTION OF THE SOLAR ENVELOPE (LEVEL SITE)



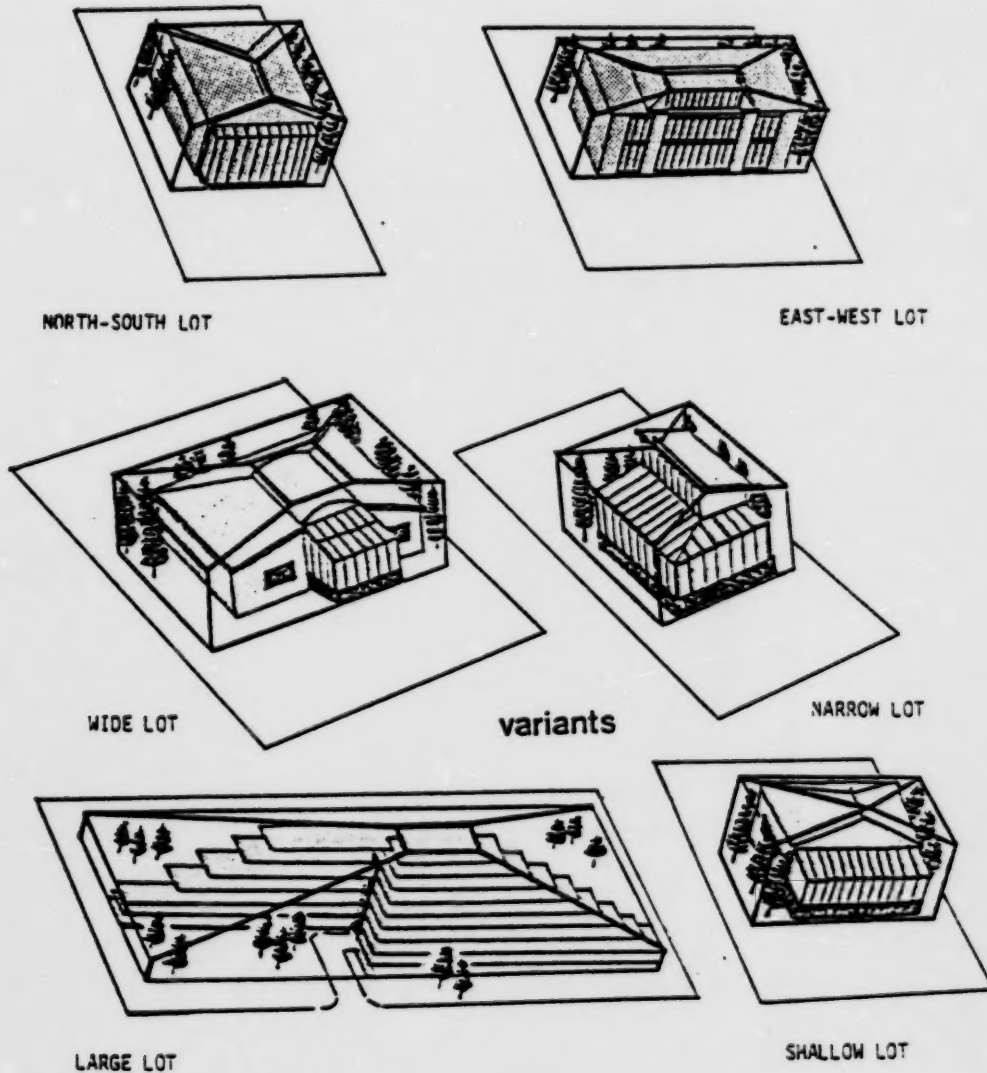
(SLOPING SITE)



diag. 9: CONSTRUCTION OF A SOLAR ENVELOPE ON A LEVEL OR SLOPING SITE.

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This procedure may produce a variety of shapes to allow sunlight penetration in accordance with lot orientation, depth and size, as shown below:-



Diag. 10: VARIANTS OF THE SOLAR ENVELOPE

3. Application

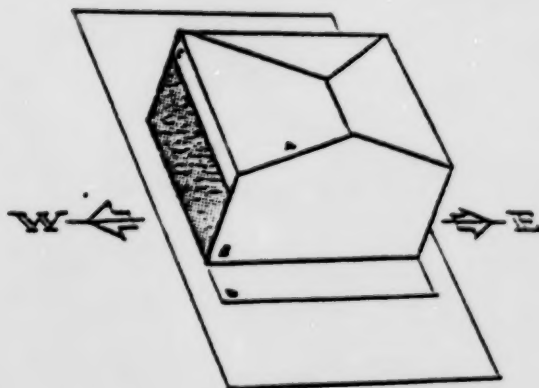
All new development, or addition to an existing development, should be contained within the solar envelope appropriate to the subject lot.

If compliance with the GUIDELINES results in a minor deviance from the requirements of AZ-64, an application may be made to the Committee of Adjustment for a variance from the provisions of AZ-64.

3. SHADE CONTROL

A. Definitions

- (i) **SHADE CONTROL:** A control on the duration and area of shade produced, or likely to be produced, on a 'protected surface' by proposed building development, sign or growing vegetation.
- (ii) **PROTECTED SURFACE:** A surface exposed to sunlight by virtue of its location on the following planes of a 'solar envelope' (as defined in CONTROLS 1 and 2).



- A. The sloped or horizontal planes of the envelope ceiling;
- B. The south vertical plane;
- C. A 100 cm deep strip on the east and west planes;
- D. 10% of the lot area on the south side of the property, or any other reasonable location selected and registered by the owner with the City Energy Planner, to be referred to as 'PROTECTED GARDEN'.

Diag. 11: PROTECTED SURFACES ON A SOLAR ENVELOPE.

The objectives of protecting part of the lot area as a 'protected garden' are as follows:-

1. To extend protection to sun decks or vegetable gardens which may not be part of the building structure;
2. To compensate for the overshadowing of south facades to homes built along an existing north-south street, by extending solar access protection elsewhere on their lot.

Note: The objective of relocating a 'protected garden' should not be to restrict development on an adjacent lot, but to compensate for inadequate solar access on 'protected surfaces' A, B and C, due to existing development or vegetation. Solar access to a relocated 'protected garden' will be protected through spot performance zoning stipulations on the relevant adjacent lots.

- (11) EXEMPTIONS FROM SHADE CONTROL: All existing buildings, accessory structures, signs and designated or listed vegetation shall be exempt from shading control.

8. Principles

- (1) REGISTRATION of the transfer of a PROTECTED GARDEN: A protected garden should be assumed to adjoin the south side of the principal building on a lot. It should measure the full dimension of that building on that side, multiplied by the appropriate width to give an area equal to 10% of the lot area.

Note: Part or the whole of a protected garden may be transferred to any other part of a lot, by application for a Registered Transfer to the City.

Within twenty-one (21) days of receipt of an application, the City will notify and request comment on the proposed transfer from the owners of properties on the east, south and west sides of the subject lot.

The location determined after due consultations, will be entered on a Map of Registered Transfers of Protected Gardens in the City of Ottawa, which will be available for inspection at all reasonable times.

-
- (11) PERMIT FOR THE INSTALLATION OF A SOLAR COLLECTOR: A property owner or agent wishing to retrofit one or more solar collectors on an existing structure, should submit an application for a Permit, including a drawing of the entire installation in plan(s), elevation(s) and section(s).

New development which is to incorporate solar collectors, as defined in A (11) above, will require no special permit for their installation.

Note: All applicants should ensure that an existing or new structure has a safe margin of additional bearing capacity and stability to bear the proposed collector(s).

All applicants should produce and submit a photographed panoramic view showing the structures, signs and vegetation on the east, south and west sides of the subject lot, taken at eye level, while standing in the middle of the 'protected garden'. This panoramic view will be filed with the application for future reference on shade control, to protect solar access for the property in case of vegetation growth or building development in the vicinity.

The location of a collector should be determined with due consideration of the distance, foliage characteristics and rate of growth of any existing vegetation in the vicinity.

-
- (iii) VARIANCE, NOTIFICATION AND REPRESENTATIONS: A variance should be sought from the Committee of Adjustment for any minor deviance from the requirements of AZ-64, due to compliance with these GUIDELINES. A proposed sign, development, or part of a development, which exceeds the volume of the Solar Envelope on the subject lot should cast no shadow obstructing more than 15% of the area of a solar collector on a protected surface in a neighbouring lot, at any time from 9:00 a.m. to 3:00 p.m.

Note: Diagram(s) of the shade to be cast by the proposal on December 21st at hourly intervals from 9:00 a.m. EST to 3:00 p.m. EST, will be produced by Council and within 21 days or receipt of the Application for Variance, circulated with the appropriate notification to all residents affected by the shades projected on the diagrams. The notification should explain the proposal and the procedure for making representations.

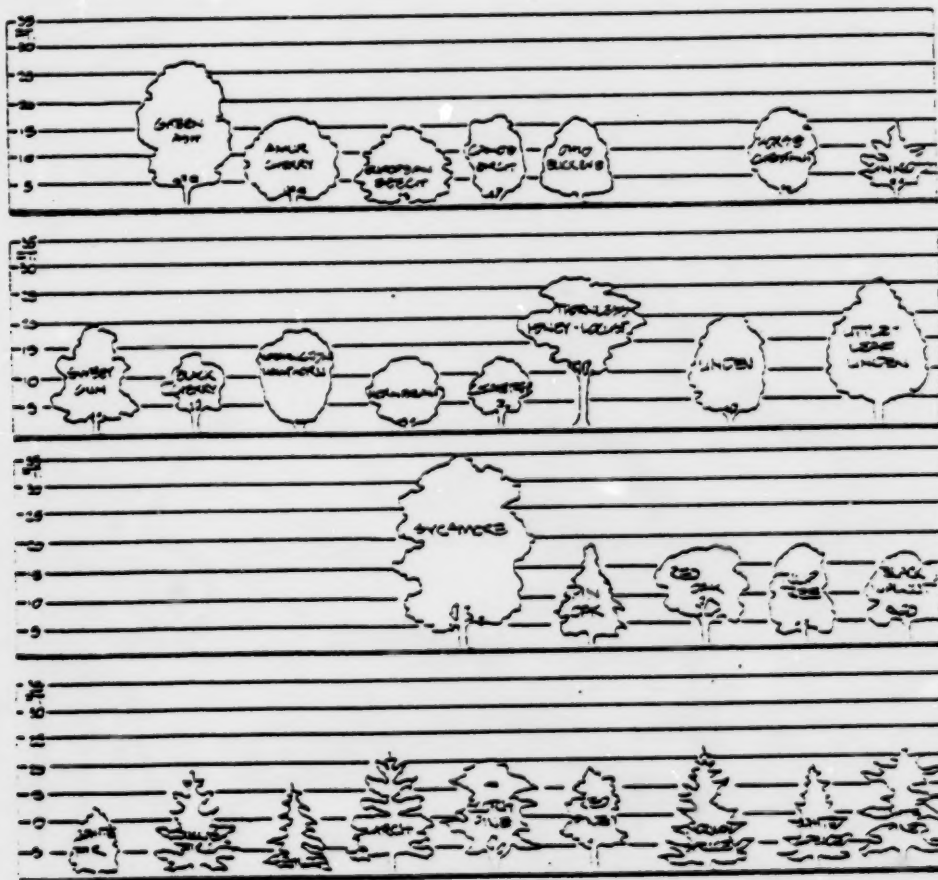
Any objection by a resident to the shading, likely to be cast on a protected surface by a proposed development, may be presented at the Planning Committee meeting on the case, unless the applicant modifies his/her proposal to the satisfaction of the Council.

-
- (iv) OBSTRUCTION BY GROWING VEGETATION: New vegetation which, through natural growth after the adoption of the present GUIDELINES by Council, exceeds the permitted 15% obstruction of sunlight on a solar collector on any day of the year, will be liable to thinning or cutting and removal of the parts casting the objectionable shading. Should the owner of the solar collector object to this shading, he may notify the trespass to the City. Following certification of trespass, the City will send 90 days' notice to the owner of the vegetation specifying the part(s) to be removed within that period.

Note: Failing compliance within the specified period, the City will convene a meeting between the owner of the collector and the owner of the vegetation.

- (v) NEW VEGETATION: Following complete removal, any replacement of the vegetation should preferably be located within the solar envelope for the subject lot and conform as regards ultimate height and volume. The following species of trees, if planted outside this envelope are considered undesirable: Willow (*Salix*), White Ash (*Fraxinus Americana*), Elm (*Ulmus*), and all types of Poplar (*Populus*).

- (vi) FENCES AND HEDGES: Property line fences, exceeding the permitted 15% obstruction of sunlight, should conform to these provisions.



Diag. 12: TREE FORMS AND HEIGHT OF RECOMMENDED TREES (after 10 years of growth)

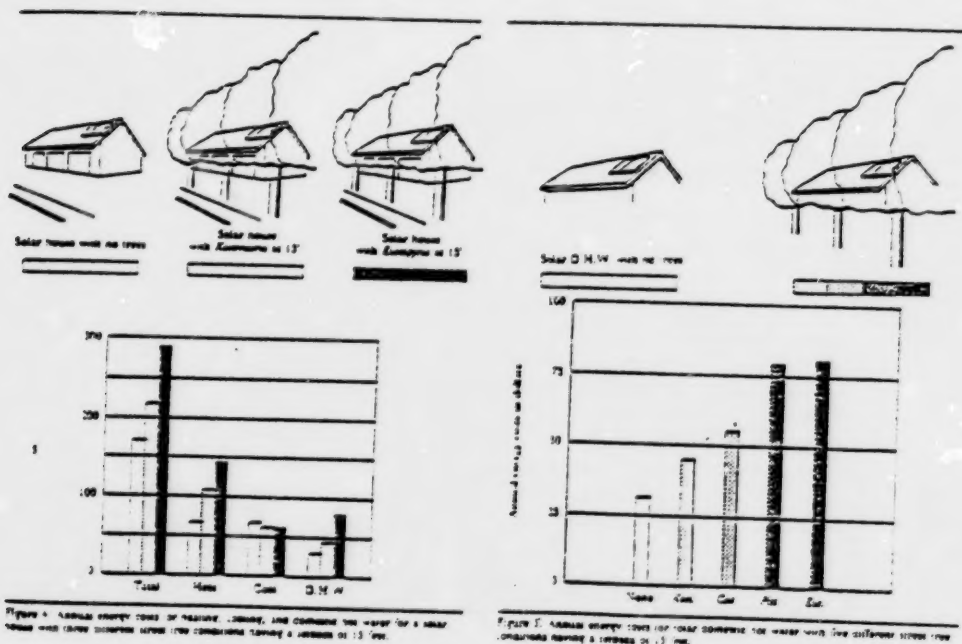
Source: Trees for American Gardens (Wyman, D. (1955) pp 101-102).

- (vii) Nothing in these GUIDELINES should prevent a property owner from planting any vegetation of his choice, which may screen, control or filter the sunlight falling on buildings located on his or her own property, in accordance with SOL-AIR ORIENTATION principles illustrated on Diag. 6

C. Application

The shade cast by a sign, chimney, dormer, mechanical equipment on the roof, fence, garage, accessory building, or part of a building erected after January 1, 1984, or by a vegetation planted after that same date, shall not exceed 15% of the area of a solar collector on a protected surface of a neighbouring property.

All existing signs, chimneys, dormers, fences, garages and accessory buildings are exempted from these provisions.



Diag. 13: EFFECT OF TREE SHADING ON ENERGY COSTS

Source: Modeling the effects of Street Trees (Thayer et al, (1988) pp 161-163).

S E C T I O N 3

ADMINISTRATIVE PROCESS CHARTS FOR THE APPLICATION OF THE
SOLAR DESIGN GUIDELINESPreamble

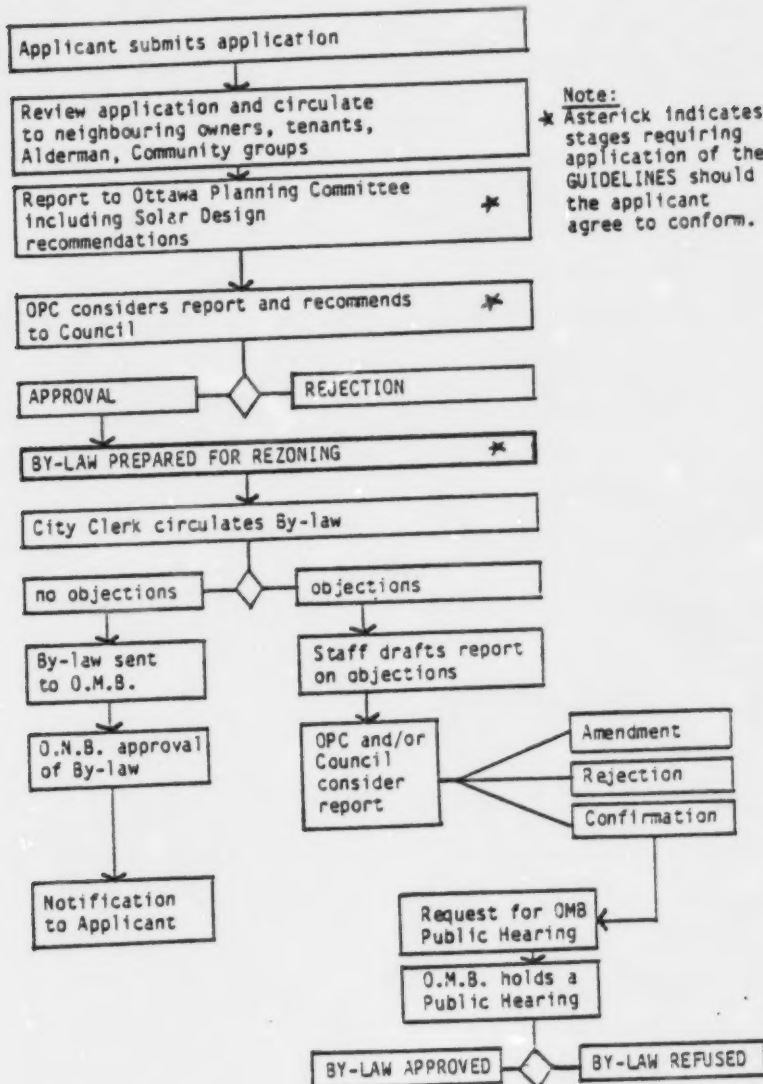
The administrative processes for the application of the GUIDELINES to proposed development in the City, may be divided into four parts as follows:-

- A. Application as part of the Zoning process;
- B. Building Permit issue procedure;
- C. Site Plan Control;
- D. Procedures which arise from the application of the GUIDELINES.

A chart will illustrate each of these procedures to help applicants follow the progress of their proposal, as it is examined for conformance by various Divisions of Planning and Buildings Branch.

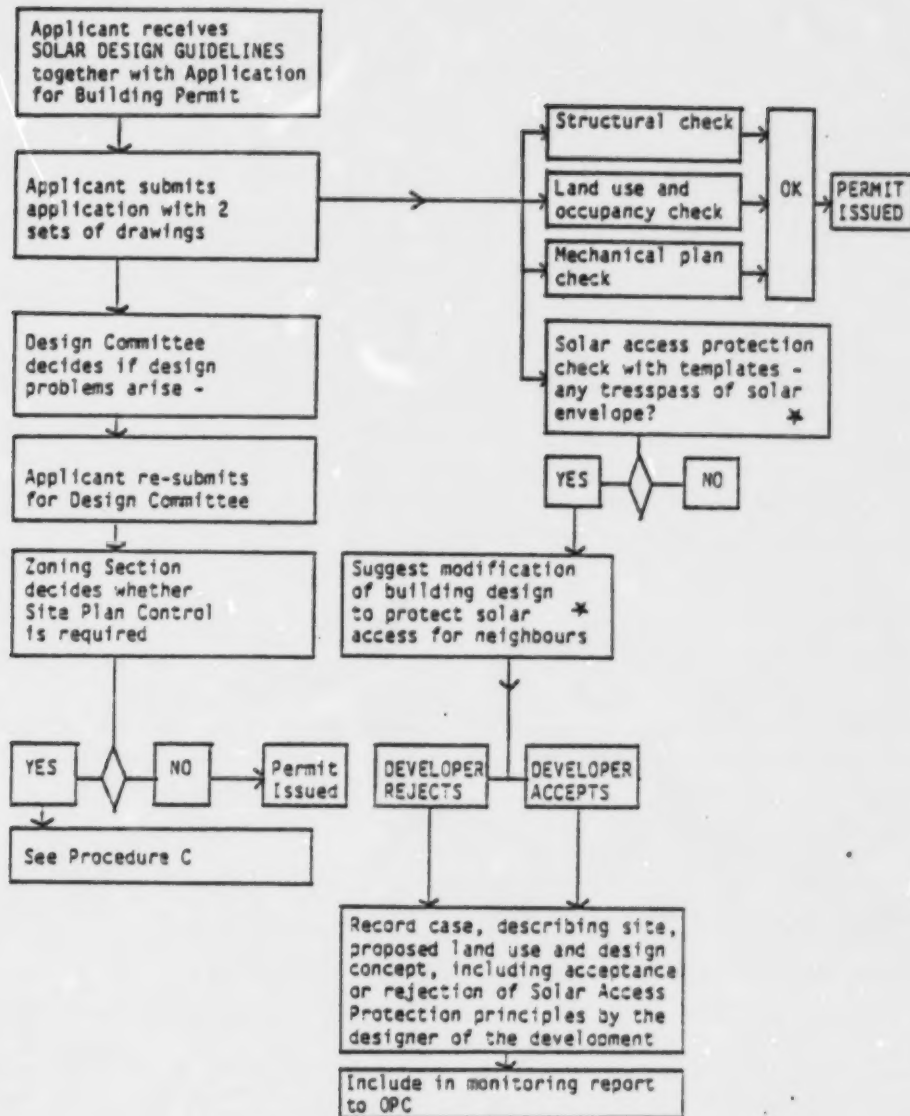
PROCEDURE A

APPLICATION FOR ZONING OR REZONING A PROPERTY



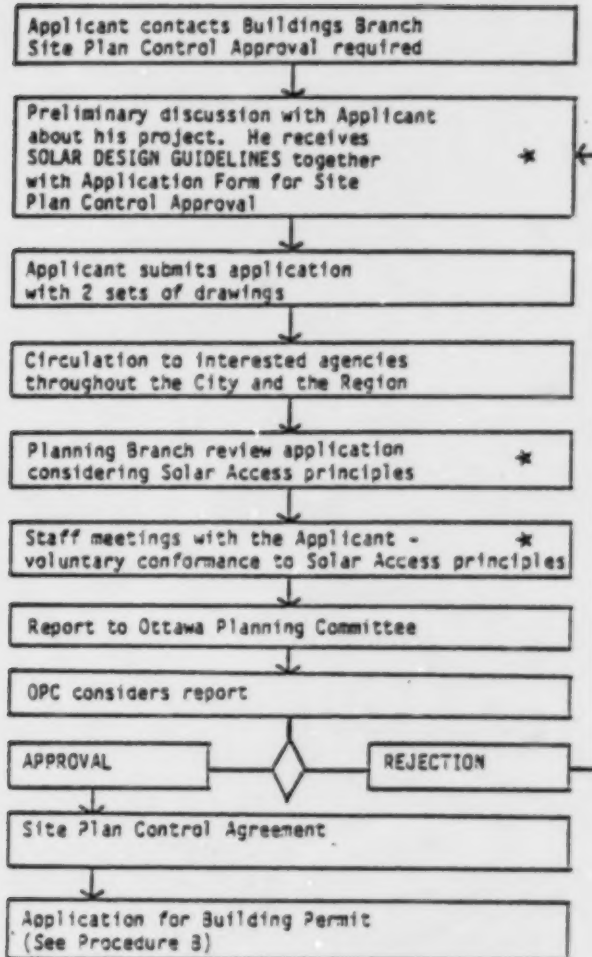
PROCEDURE B

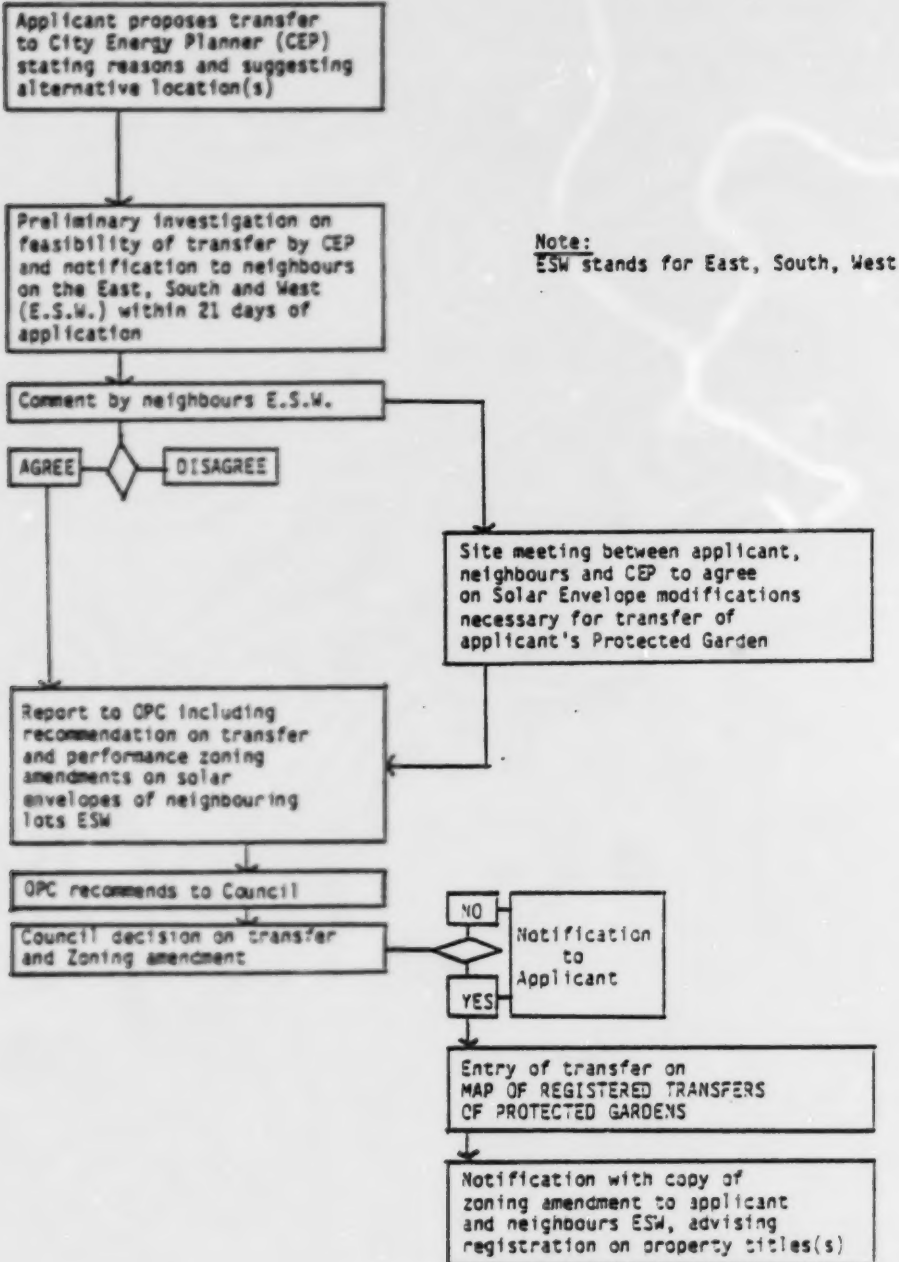
APPLICATION FOR A BUILDING PERMIT

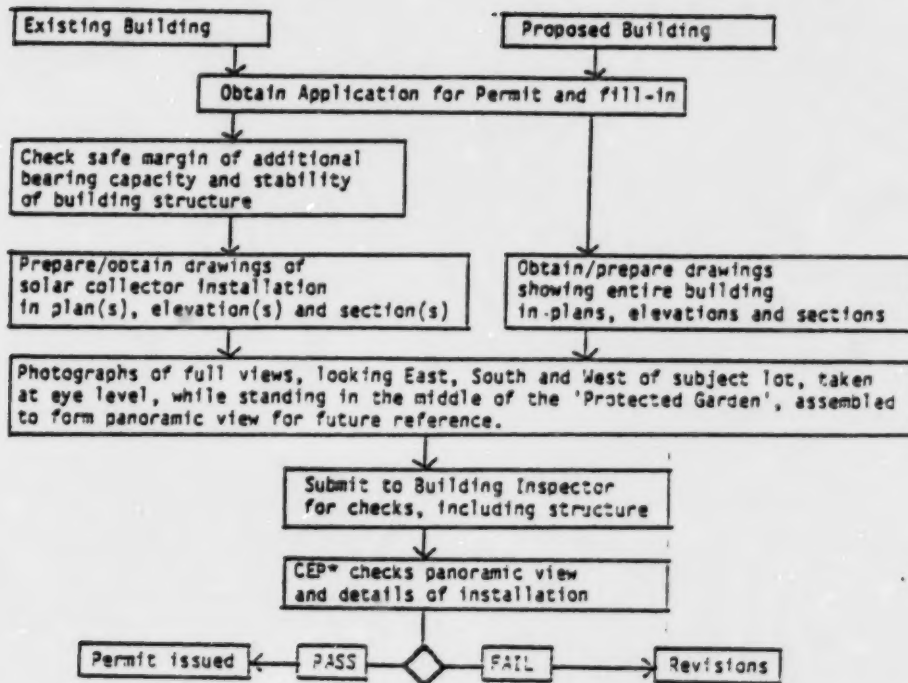


PROCEDURE C

SITE PLAN CONTROL



PROCEDURE D (1)APPLICATION FOR THE TRANSFER
OF A PROTECTED GARDEN

PROCEDURE D (11)APPLICATION FOR A PERMIT
TO INSTALL A SOLAR COLLECTORNote:

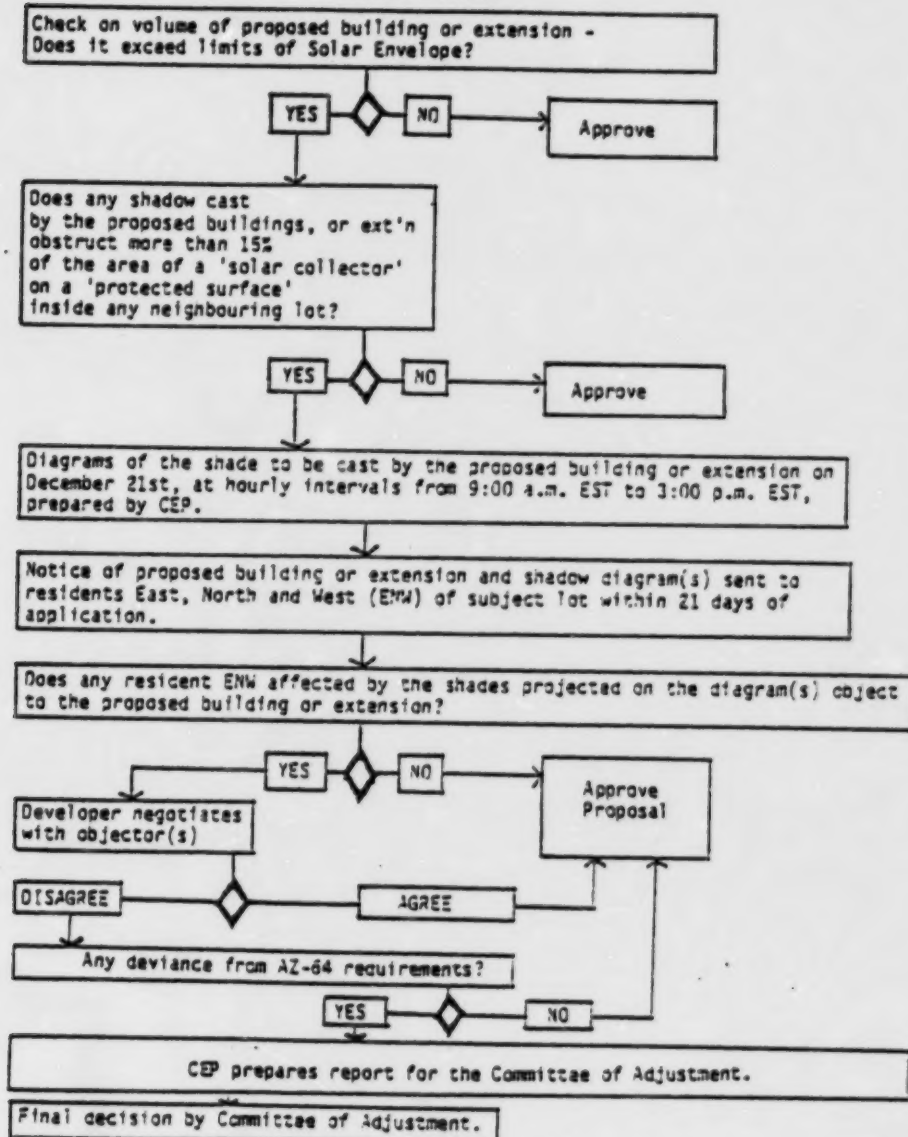
CEP* = City Energy Planner

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PROCEDURE D (111)

OBSTRUCTION OF SUNLIGHT BY A DEVELOPMENT PROPOSAL

VARIANCE, NOTIFICATION AND PUBLIC HEARING

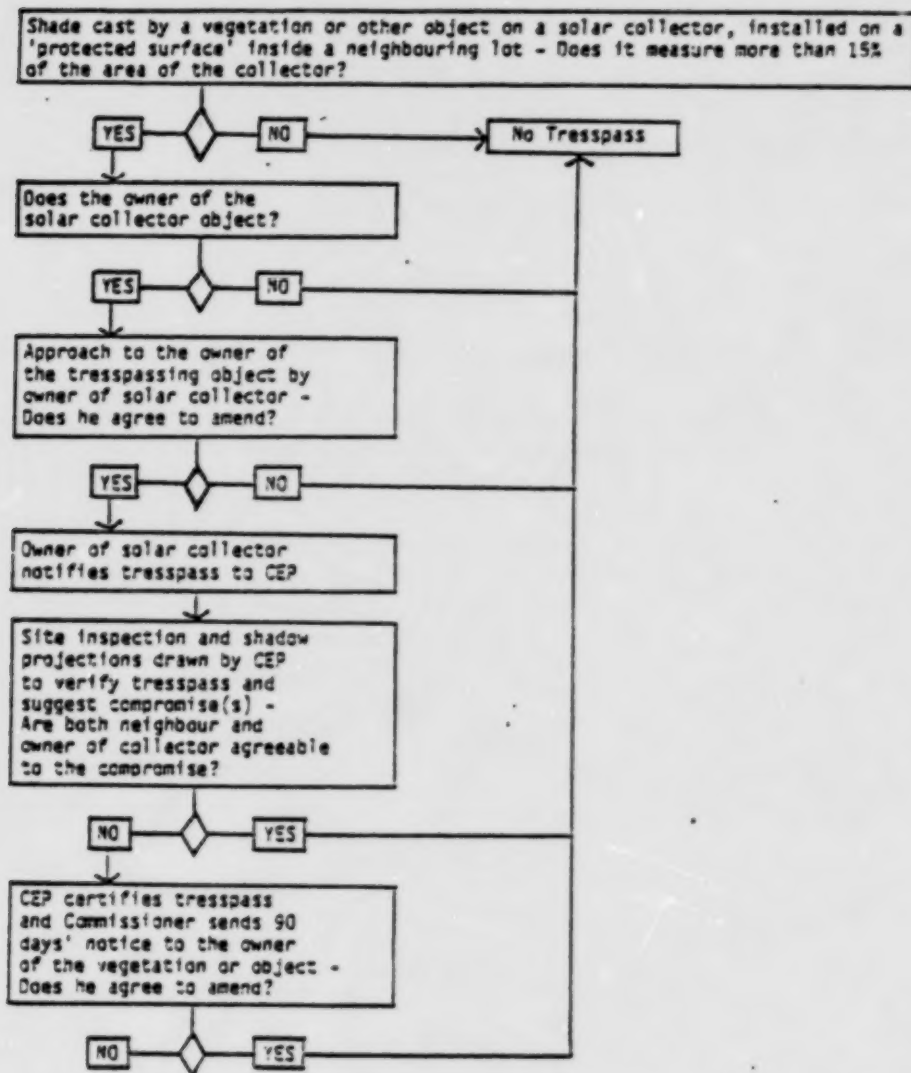
Note:

CEP = City Energy Planner

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PROCEDURES D (iv), (v) and (vi)

OBSTRUCTION OF SUNLIGHT BY NEW VEGETATION, FENCES, SIGNS AND OTHER OBJECTS



EPILOGUE

The success of these GUIDELINES will be judged by the inspiration they provide to designers for innovative solar architecture and by the solar access protection they ensure to property owners and tenants in the City. Comments on the performance of these GUIDELINES by building designers and residents will therefore be most welcome, to help improve and extend their application onto novel technological developments and solar design features.

Please send your comments to:

The City Energy Planner
City Hall
111 Sussex Drive
Ottawa, Ontario
K1N 5A1

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D E F I N I T I O N S

ACTIVE SOLAR SYSTEM:	A system which collects, transmits and stores solar energy as usable heat, by reliance on mechanical means or a chemical process.
CONDUCTION:	The transmission of heat through a solid material, or from a solid to a fluid which are in direct contact with each other.
CONVECTION:	The movement set up in a fluid by the reception or loss of heat, to spread the resulting higher or lower temperature throughout its volume.
EUTECTIC SUBSTANCE:	A substance capable of changing its phase state from solid to liquid and from liquid to gas, in accordance with the quantity of heat absorbed - e.g., ice; water; steam.
GREENHOUSE EFFECT:	See pp. 4 and 5.
HEAT STORAGE:	Retention of the heat absorbed from any source for as long as possible. Current technology relies on enclosed or thoroughly insulated solid (e.g., pebbles), fluid (e.g., air), or eutectic substances. Reversible chemical reactions are also a promising avenue.
INSULATION:	Solid or fluid substances or a combination of both, able to resist the flow of heat.
ORIENTATION:	Direction of the longest axis of a structure.
PASSIVE SOLAR SYSTEM:	A system which collects and stores the heat accumulated through the greenhouse effect in an enclosure, into the massive parts of the structure forming that enclosure and subsequently releases the heat to surrounding fluids through conduction and convection.
PHOTOVOLTAIC CELL:	A device to convert any light into electric current. Monocrystals, polycrystals and amorphous silicon wafers have been used for some cost effective applications on earth.
PROTECTED SURFACE:	See p. 21.
RADIATION:	The transfer of heat from a warm, luminous or shining body to a cooler solid or fluid substance, by the transmission of waves of photons - light energy units - travelling through vacuum, through the exchange of electromagnetic energy.

SHADE CONTROL:	See p. 21.
SKYWINDOW:	The opening to the sky which should theoretically be available to any solar collector on earth. It is formed by tracing the highest and lowest sunpaths in the year for the collector's latitude (i.e., June 21st and December 21st respectively) and drawing the vertical lines representing sunlight reception between 9:00 a.m. and 3:00 p.m. at the collector's longitude (See Diag. 2).
SOL-AIR ORIENTATION:	A building orientation which ensures maximum comfort conditions for the human body by the absorption of maximum solar energy in the morning hours and the control of solar radiation in the afternoon hours. (For Ottawa, this orientation means that buildings should face 12° East of South, or an azimuth of 168° see Diag. 6).
SOLAR ACCESS:	Unobstructed reception of solar energy by a solar collector placed on a protected surface, for at least 85% of the collector's area, for 6 hours; or 100% of its area for 5 hours between 9:00 a.m. and 3:00 p.m. EST.
SOLAR ALTITUDE:	The vertical angle subtended by the sun at a point of solar energy reception on earth, measured between the horizontal direction and the height of the sun at a particular moment - see Diagram 3.
SOLAR AZIMUTH:	The horizontal angle subtended by the sun at a point of solar energy reception on earth, measured clockwise between North and the direction of the sun at a particular moment of the earth's rotation - see Diagram 3.
SOLAR COLLECTOR:	See p. 11 and Diagram 5.
SOLAR DESIGN:	The imaginative use of materials to control the reception of solar energy - in terms of light, heat and radiation - by managing the processes of conduction, convection and radiation.
SOLAR ENERGY:	The energy produced by thermonuclear fusion of hydrogen into helium on the sun and transmitted by electromagnetic waves of infrared and ultraviolet radiation into space.
SOLAR ENVELOPE:	See pp. 17 and 18.

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THE "SOLAR DESIGN PIONEER" CERTIFICATION
PROGRAMME (April - July 1983)

The objectives of this voluntary participation programme were (a) to provide incentives to building designers and developers for the utilization of solar energy to best advantage in existing and new development; and (b) to apply the Solar Access Protection Principles, in order to test the feasibility of their City-wide application as a by-law, or as solar design guidelines.

Incentives and publicity

Two types of incentives and a limited amount of publicity were used in order to attract participation.

The first incentive was the award of a SOLAR DESIGN PIONEER certificate shown on p. 2 of this Attachment. This was offered to the designer of a building which incorporated (i) a solar design feature - a large double-glazed window, a sun deck, or solarium, for example - and (ii) appropriate corridors between his proposal and existing neighbouring buildings to ensure at least 6 hours of solar access to all the properties involved.

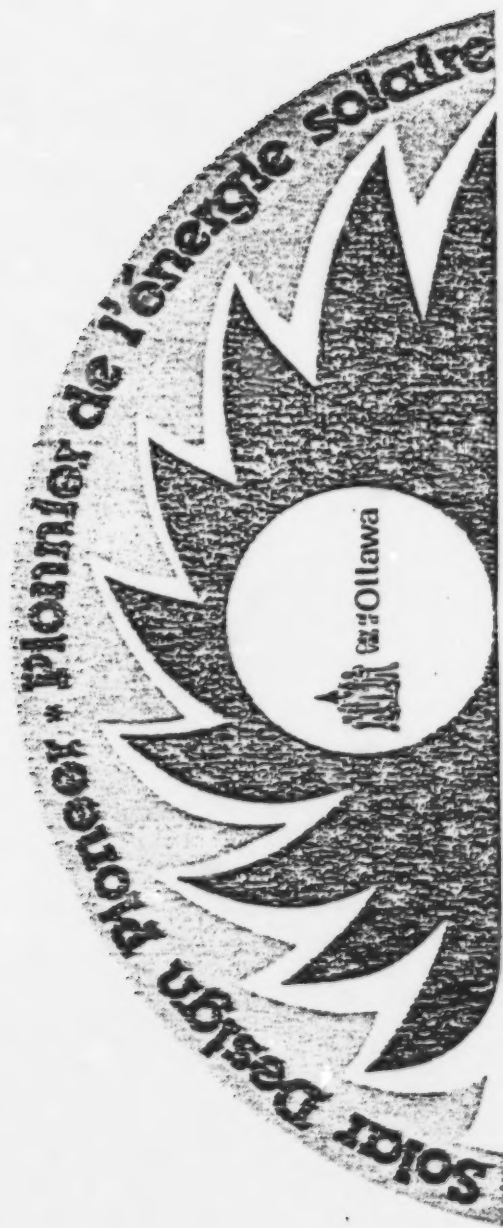
The second incentive was across-the-counter advice to applicants for Site Plan Control or Building Permit, as to solar design features, orientation and materials to incorporate for the use of solar energy to best advantage, together with suggestions as to necessary modifications to building shape or volume, to allow solar access to neighbouring properties.

As regards publicity, the Programme was advertised on three separate issues of the CITIZEN and LE DROIT by means of CONSERVATION PIPELINE articles (p. 3 of this Attachment) in which interested readers were invited to call for their copy of the bilingual SOLAR DESIGN GUIDE (pp 5-16 of this Attachment). All architects and building contractors in Ottawa received their copy of this Guide and a further 834 were collected from the Energy Conservation Counter at City Hall (7th Floor), or sent out in response to requests by telephone.

Results

A total of 534 proposals were considered under the programme and the attached list of successful applicants for the award of the Certificate is submitted for the Council's approval. A detail statistical analysis of the results will be found in Attachment 3.

In conclusion, the programme met fully the objectives set for it and helped Planning Branch in reaching many of the decisions presented in this Report.



In accordance with the criteria
adopted by the municipal Council

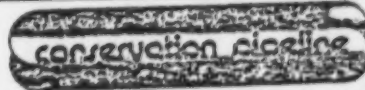
Selon les critères adoptés
par le Conseil municipal

designed a building which
incorporates innovative
features for the utilization of
solar energy and the
enjoyment of solar access by
neighbouring properties.

a conçu un édifice qui comporte
un système original de capter
l'énergie solaire sans
porter atteinte au droit
à l'ensoleillement des
propriétés voisines.

address/adresse

date



With the rates of interest for loans and mortgages coming down and the government providing incentives for renovation and new construction, you may well be tempted to extend your home, build or buy a new one to accord with your lifestyle.

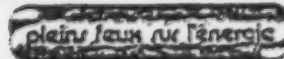
One feature that crops up consistently in many applications for Building Permits at City Hall is 'solar design'. This may mean a large double-glazed window to the living room, a solarium or greenhouse on the south side, the orientation of buildings to the sun, occasionally, even the solar collector on the roof. Architects, builders, do-it-yourself enthusiasts and ordinary people in Ottawa are becoming increasingly aware of the possibilities offered by the sun for original design, energy-efficiency and home relaxation. And the

climate fully justifies this approach—Ottawa enjoys some 2000 hours of bright sunshine during the year on average, a higher figure than Vancouver (1600-1800 hours) or Windsor (1900 hours) which are located in lower latitudes. In order to encourage the development of a creative and science-based 'solar' architecture and building technology, the City of Ottawa is launching the SOLAR DESIGN PIONEER Programme. As indicated by the certificate below, the designer wishing to qualify as a pioneer, has to incorporate an innovative feature related to 'solar' and build in a way that does not deprive a neighbour from the enjoyment of sunlight and the use of solar technology. By virtue of climate and the existing pool of labour and institutions related to research, the Ottawa region is particularly well suited for the development of solar technology.



Help to make
Ottawa
the
Energy-Efficient
Capital

For your copy of the
Solar Design Guide,
Call: The City Energy Planner
at 563-3000



Étant donné que les taux d'intérêt sont à la baisse pour les prêts et hypothèques et que le gouvernement offre des primes d'encouragement pour les rénovations et les nouvelles constructions, vous serez peut-être tenté d'agrandir votre maison ou d'en construire ou d'en acheter une nouvelle pour répondre aux besoins de votre mode de vie.

Un des sujets qui revient souvent dans les demandes de permis de construction à l'Hôtel de ville, c'est la "construction solaire". Ceci peut signifier une grande fenêtre à double vitre dans le salon, un solarium ou une serre donnant sur le sud, l'orientation des bâtiments vers le soleil et même, à l'occasion, un collecteur d'énergie solaire sur le toit. Les architectes, constructeurs, amateurs de bricolage et la population d'Ottawa en général deviennent de plus en plus conscients des possibilités offertes par le soleil pour des plans originaux, une utilisation efficace de l'énergie et la détente à la maison. Et le climat justifie pleinement cette approche — Ottawa jouit de quelque 2,000 heures de soleil pendant l'année, en moyenne, un chiffre plus élevé qu'à Vancouver (1,600-1,800 heures) ou Windsor (1,900 heures) qui sont situées à des latitudes plus australes!

Afin d'encourager la mise au point d'une architecture et d'une technologie de construction créatrices et basées sur la science pour l'emploi de l'énergie solaire, la Ville d'Ottawa lance un programme de PIONNIER DE L'ÉNERGIE SOLAIRE. Tel que l'indique le certificat ci-dessous, le concepteur désirant décrocher le titre de pionnier doit incorporer une particularité relative à l'énergie solaire et construire de façon à ne pas priver ses voisins du droit à l'ensoleillement et à l'utilisation de la technologie de l'énergie solaire. En vertu du climat et des équipes existantes de main-d'œuvre et d'institutions travaillant à la recherche, la région d'Ottawa est toute désignée pour le développement de la technologie de l'énergie solaire.

**FAITES D'OTTAWA LA
CAPITALE DE L'UTILISATION
EFFICACE DE L'ÉNERGIE**

Pour obtenir un exemplaire du Guide
de l'énergie solaire, communiquez
avec le responsable
municipal de l'énergie au **563-3000**



In consultation with the
criteria adopted by the
municipal Council

selon les critères
adoptés par le
Conseil municipal

(APPLICANT/INCULPANT)

Designed a building whose
construction incorporates
features that the utilization of
solar energy will be
representative of new trends in
complementary properties

A conçu un bâtiment-voit
conception qui incorpore
caractéristiques qui
représentent l'énergie solaire
et l'architecture des
propriétés complémentaires

Signature of applicant/Incipient: _____ Date: _____

LIST OF SUCCESSFUL APPLICANTS FOR THE AWARD OF
THE "SOLAR DESIGN PIONEER" CERTIFICATE

Aia-Kantti
L.P. Koffman
D.B. Gladwin
James Granger
Arnon Development Corp.
Goldberg, Shinder
Gilles Laurin

T.C. Assaly
J.K. Howard
Peter Fitzgerald
TRU-Class Constr.
Joyce Morgan
Don Montgomery
Maria Carrozzi

M. Singhal
Talbak Construction Ltd.
Tartan Development Corp.
Greenboro Homes Ltd.
Paul Rodier
Qui-Con Ltd.
Hab-Com Ltd.

Solterra Developments Ltd.
Valley - Vu Realty of Ottawa
Mutual Press Ltd.
Young and Wright
Katz & Webster Associates
Murray & Goodz
Claude Design Ltd.

Bruce Levine
Bruce Laughan
Barry J. Hobin & Assoc.
John E. Davies & Assoc.
Edward J. Cuhaci
William J. Webster
Cumming Cockburn Assoc.

Marc Pavic
D. Dennehy
Alistair Gale
Hoshang Esienbolli
Chris Bain
M.E. Matusiak
S. Freen

Lorne Can
J.E. Gizeley
Scott Willis
John Baldock

Gerhard Linse
Marion Seymour
Douglas Hardie
Laurnic Investments
Wolfgang Hohaupt
Ian Jones
Agnes MacIntosh

Stel Realty Corp.
Brule Constr. Ltd.
E & P Focaccia
J. Perez Constr.
Mr. & Mrs. C. Larose
Mr. & Mrs. T. Hutchinson
Mr. & Mrs. V. Mendola

Timberlay Development Ltd.
J. Farnsworth/J. Chang
Yvan St-Denis
D. O'Flaherty
A. Riopelle
R. Cooke
J. Katnick

Peter Pivko
Helga Wintal
Doug Small
Graig, Kohler, Dickie
& Edmundson
Eriksson Padolsky
J.L. Richards & Assoc.

Sol Architectural
Jocelyn Eastland
Phil Mason
Archworks
Minto Constr. Ltd.
Alliance Housing Corp.
Winbro Homes Ltd.

Ken Lagasse
Joseph Loch
B. Harrison
M. Jenkin
Kendel & Dorothy Rust
Mr. & Mrs. I. Martin
Joseph Cama

David Yenson
Michael Nauth
Farley Martin
R.W. Arnett

Tony Donato
Don Smiley
Frank Cotroneo
John Purdon
G.W. Hartsignore
Denis Regimbald

Murray & Murray,
Griffiths & Rankin
Dimakopoulos & Ass.
The Sunwrights
Mohaupt Concepts Inc.
Manda Investments Ltd.
Urbandale Constr.

F. Lambert
C. Jackson
G. Armen
G. Galdins
R. Dagenais

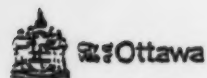
Miska, Gale & Ling
F. Perpino
F. & L. Foerster
Mr. & Mrs D. MacKay
José Martins

Tartan Homes Ltd.
Iber Developments Inc.
Greenboro Homes Ltd.
Fairhall & Moffat Ltd.
Michael Wolfson
Dan Byrne

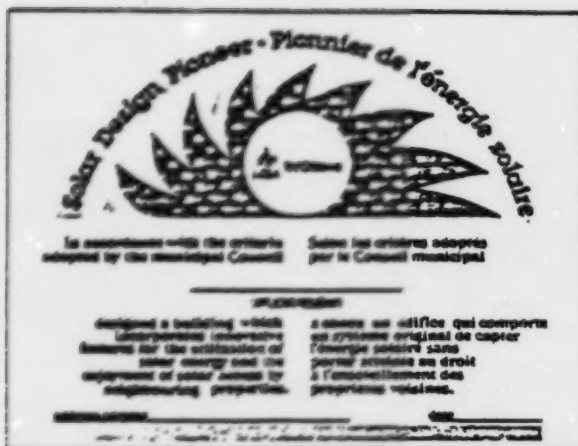
C. Svoboda
Glen Gray
T.K. McMullen
D.O. Crabtree
John Sydor
Richard D. Dugas

Forrest Smith
Dave Robinson
Dave Baker
Brian Grier

GA:sm-5
060028



solar design guide



Would you like to earn this certificate?

You could earn it with a solar design for your next project - whether a multimillion new building complex, or a backyard extension.

This guide will explain to you the City of Ottawa's Solar Design Certification Programme - an incentive on design buildings to use solar energy to best advantage, with a civilized approach to your neighbour's rights to enjoy solar access on their property.

Why use solar energy?

The sun has been shining on the earth for the last 4 billion years and as far as astronomers can tell, it will continue to shine for at least another 4 billion years...

THE WE STAND TO BENEFIT FROM THIS PRACTICALLY UNLIMITED SOURCE OF ENERGY

Every form of life on earth has been benefiting in some way since time immemorial, but with the increasing cost of energy and growing confidence in technology and design, we could think of ways...

- to heat the interior and exterior spaces of our buildings
- to heat water for our various needs
- to light interior spaces in functional and dramatic ways
- to enhance the meaning of building volumes and show an architectural design to best advantage
- to relax and enjoy the sun
- to grow plants indoors and outdoors
- to grow food wherever, whenever and however we want...to beat pollution as well as inflation

ALL WE NEED TO DO IS DESIGN FOR SOLAR ACCESS

And you certainly don't have to be a qualified architect to become a

SOLAR DESIGN PIONEER

In Holland, ordinary country folk have been designing greenhouses for hundreds of years.

In Ottawa, any applicant for a building permit, for rezoning, or site plan control has a chance to qualify and obtain a milestone certificate as

A SOLAR DESIGN PIONEER

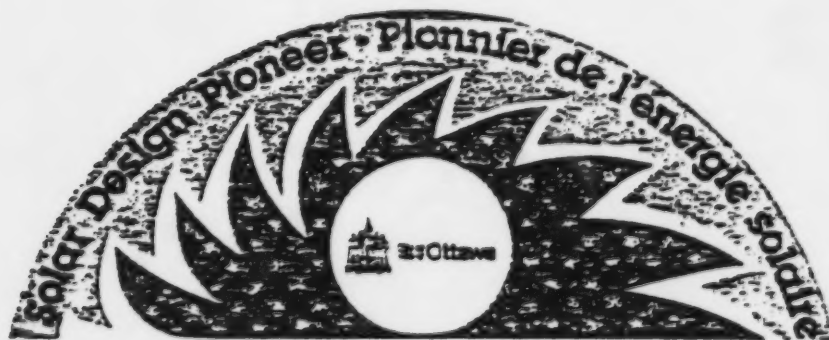
by designing or modifying a proposal voluntarily, to conform with the City's experimental

SOLAR ACCESS BY-LAW

This experimental application of the By-law to all parts of the City will be terminated on June 30, 1983.

So hurry up...

HERE IS A UNIQUE OPPORTUNITY TO EARN A CERTIFICATE TO BE PROUD OF



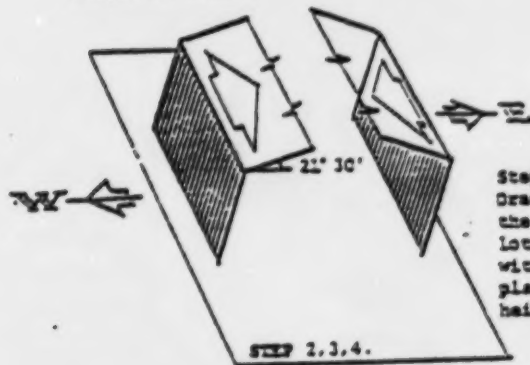
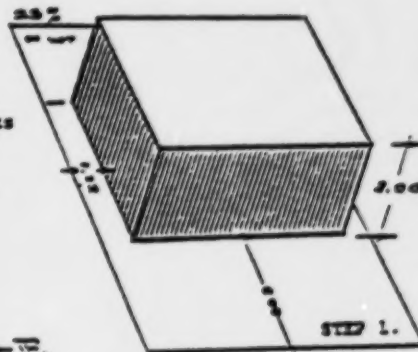
How does one design for Solar Access?

Here are a few simple steps, as extracted from the experimental or Model Solar Access By-Law:

1. SET UP THE "SOLAR ENVELOPE" FOR THE SITE OF YOUR PROJECT.

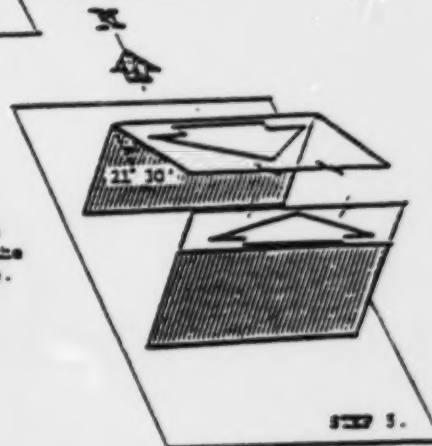
CONSTRUCTION OF THE SOLAR ENVELOPE
(Level Site)

Step 1.
Mark the front, side and rear setbacks for your site (see AZ-64 provisions applicable to the zone) and project them vertically to the maximum eaves height of 8.00 m.



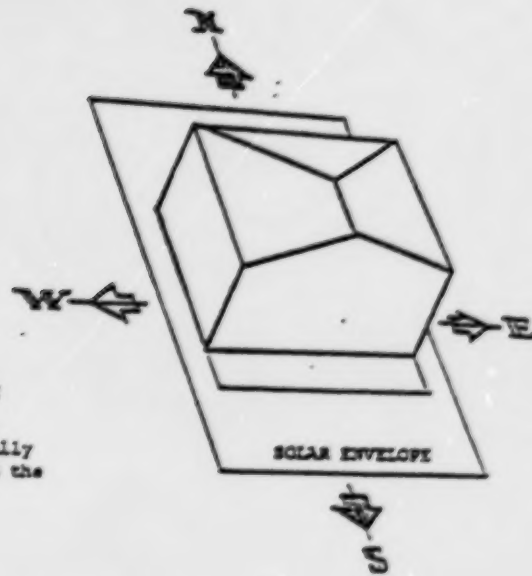
Step 2,3,4.
Draw the ceiling of development along the East, West and North sides of the lot at an angle of 21° 30' to intersect with each other, or with the horizontal plane at maximum permissible building height for the zone.

Step 3.
Extend the vertical plane along the setback line on the South side of the lot, to meet the planes drawn above.



COMPLETED SOLAR ENVELOPE
(for typical site)

Note: Wide lots will usually
have a flat part at the
apex.



2. NOW YOU MAY DESIGN YOUR PROPOSAL TO FIT WITHIN THE SOLAR ENVELOPE.



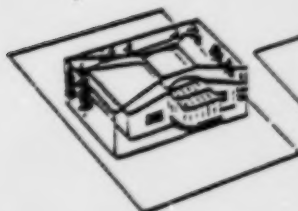
NORTH-SOUTH LOT



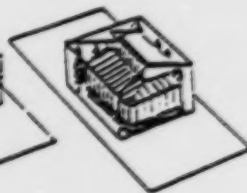
EAST-WEST LOT



SHALLOW LOT



WIDE LOT

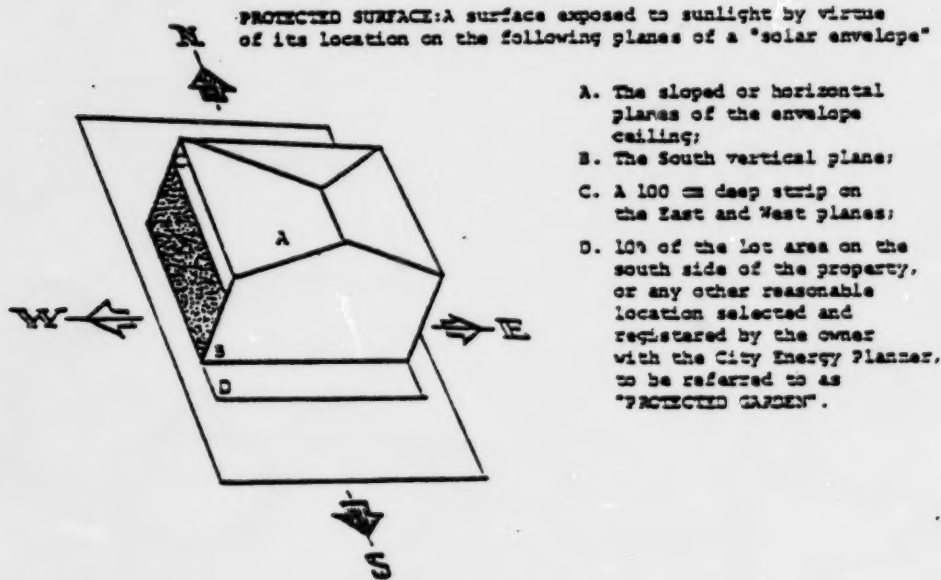


NARROW LOT



LARGE LOT

3. CONSIDER PASSIVE OR ACTIVE USES OF SOLAR ENERGY FOR THE "PROTECTED SURFACES" OF YOUR DESIGN AND SITE.



Examples of passive or active use of solar energy.

- large windows on south facade ;
- solarium or greenhouse on the protected garden ;
- skylights, photovoltaic cells, or solar collector panels on the roof ;
- clearstorey lighting and passive solar heating on the east and west strips , to reach northeast or northwest rooms, which are usually cold and humid.

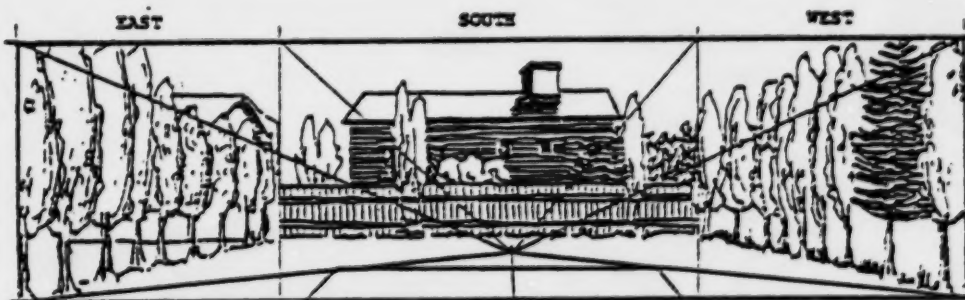
The By-law allows you to design any "Protected Surface" shown above, as a SOLAR COLLECTOR: A material surface exposed to sunlight, measuring a minimum of 60x60 cm in length and width, or 3600 sq. cm in area and forming the cover of an enclosure, in which, by passive or active means, collects and stores heat.

4. CONSIDER TRANSFERRING THE "PROTECTED GARDEN" TO A SUNNIER PART OF THE SITE, IN ACCORDANCE WITH THE PROVISIONS OF THE MODEL BY-LAW.

If the south side of the principal building is likely to receive less than 5 hours of sunshine between 9:00 a.m. and 3:00 p.m., Eastern Standard Time, the Model By-law entitles you to apply for a transfer of the "Protected Garden".

The objective of relocating a "protected garden" shall not be to restrict development on an adjacent lot, but to compensate for inadequate solar access on "protected surfaces" A, B and C, due to existing development or vegetation. Solar access to a relocated "protected garden" shall be protected through spot performance zoning stipulations on the relevant adjacent lots.

5. OBTAIN PHOTOGRAPHS TO FORM A CONTINUOUS VIEW OF THE EAST, SOUTH AND WEST SIDES OF THE SITE AND ADJOINING PROPERTIES.

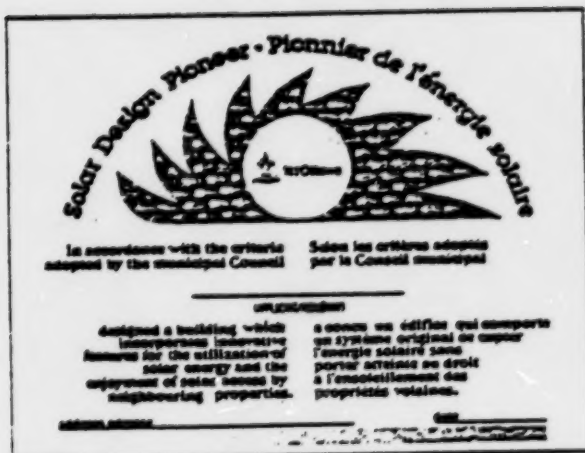


Stand in the middle of the "Protected Garden" of your site, hold the camera straight and take eye-level photos East, South, West.

6. SUBMIT YOUR DESIGN AND PHOTOGRAPHS TO THE DEVELOPMENT CONTROL SECTION AT CITY HALL (7th Floor), MARKING IT: SOLAR DESIGN

For enquiries or advice on your project call:

The City Energy Planner at 563-3000



Ottawa

guide du programme de l'énergie solaire

Voudriez-vous obtenir ce certificat?

Vous y êtes admissible si votre projet de construction est conçu en fonction de l'énergie solaire, que ce soit un nouveau complexe de bureaux de plusieurs milliards de dollars ou tout simplement un ajout à votre maison.

Vous trouverez ci-dessous la description du programme municipal de certificat en matière d'énergie solaire - un programme visant à encourager la conception et la construction de bâtiments qui utilisent l'énergie solaire à bon escient tout en protégeant les droits à l'ensoleillement des propriétaires fonciers avoisinants.

Pourquoi l'énergie solaire?

Parce que le soleil plombe sur la Terre depuis plus de quatre milliards d'années et que les astronomes prédisent qu'il en fera autant pendant quatre milliards d'années encore...

IL FAUT TIENIR PROFIT DE CETTE SOURCE D'ÉNERGIE PRESQUE INÉPUISISSE

Depuis des temps immémoriaux, toutes les espèces de vie sur la Terre ont profité du soleil mais étant donné la hausse des coûts de l'énergie et l'essor technologique ainsi que les nouvelles adaptations en matière de conception, nous pourrions songer...

- à chauffer l'intérieur et l'extérieur de nos bâtiments;
- à éclairer l'intérieur des bâtiments de façon pratique et esthétique;
- à optimiser le regroupement des bâtiments et à favoriser leur conception architecturale;
- à se détendre et à profiter du soleil;
- à faire pousser des plantes tant à l'intérieur qu'à l'extérieur;
- à cultiver des denrées à notre gré dans le but d'éliminer la pollution et de vaincre l'inflation.

IL S'AGIT TOUT SIMPLEMENT DE CONCEVOIR LA CONSTRUCTION EN FONCTION DE L'ÉNERGIE SOLAIRE
Il ne faut pas forcément être architecte pour devenir

PIONNIER DE L'ÉNERGIE SOLAIRE

En Hollande, les gens de la campagne conçoivent et construisent des serres depuis des centaines d'années.

À Ottawa, toute personne faisant une demande de permis de construire, de changement de zonage ou d'approbation de plan d'emplacement est admissible au programme et pourra être le récipiendaire de certificat de marque en tant que

PIONNIER DE L'ÉNERGIE SOLAIRE

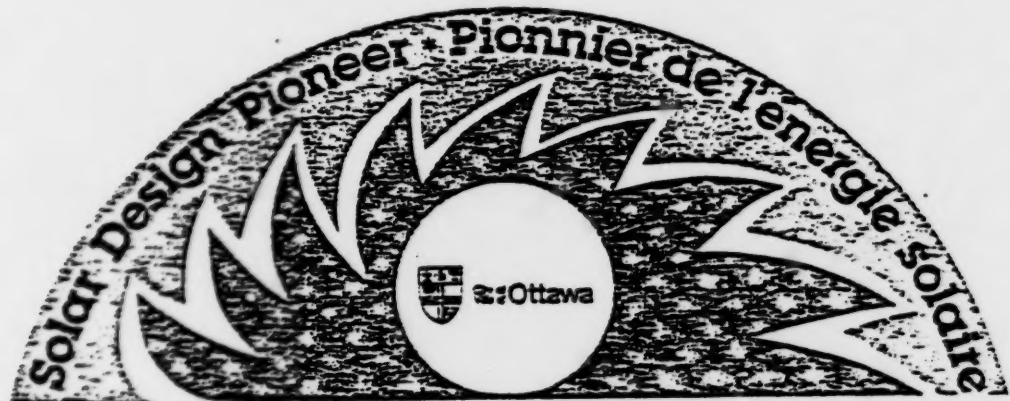
en concevant ou en modifiant un projet volontairement pour respecter

L'ARRÊTÉ MUNICIPAL SUR L'ACCÈS À L'ENSOLEILLEMENT

Cette application de l'arrêté municipal, à titre d'essai, dans l'ensemble de la ville prend fin le 30 juin 1983.

- Alors, ne tardez pas à présenter votre projet.

VOICI L'OCCASION D'OBTENIR UN CERTIFICAT DONT VOUS SEREZ FIER
TOUTE VOTRE VIE!



Comment concevoir un bâtiment en fonction de l'énergie solaire?

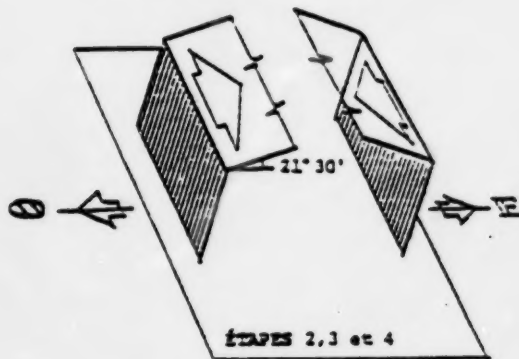
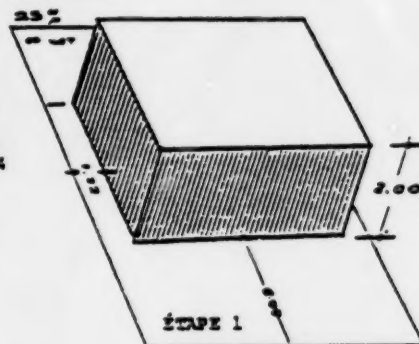
Voici quelques étapes simples pour y arriver, telles que tirées de l'arrêté municipal type sur l'accès à ensoleillement:

1. CRÉEZ UNE "ENVELOPPE SOLAIRE" POUR VOTRE PROJET.

construction d'une enveloppe solaire
(terrain de niveau)

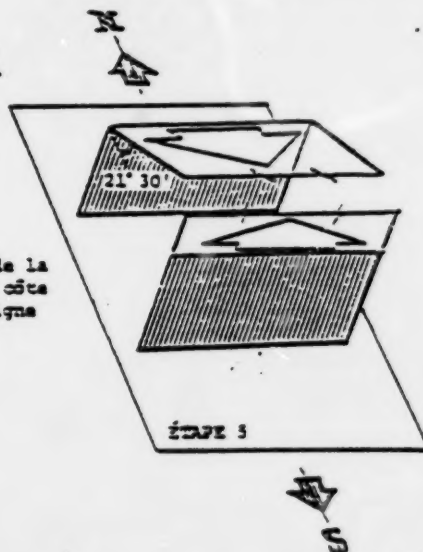
étape 1.:

Indiquez les marges de recul avant, arrière et latérales de votre terrain (en fonction des dispositions de AZ-64 qui s'appliquent à votre zonage) et projetez ces lignes verticalement à la hauteur maximale des avant-toits, soit 8 mètres.



étapes 2, 3, et 4.:

Dessinez les plans du planfond du projet le long des côtés est, ouest et nord du terrain en utilisant un angle de 21° 30' de sorte que les lignes se croisent ou croisent le plan horizontal permis en vertu de la hauteur maximale du zonage.

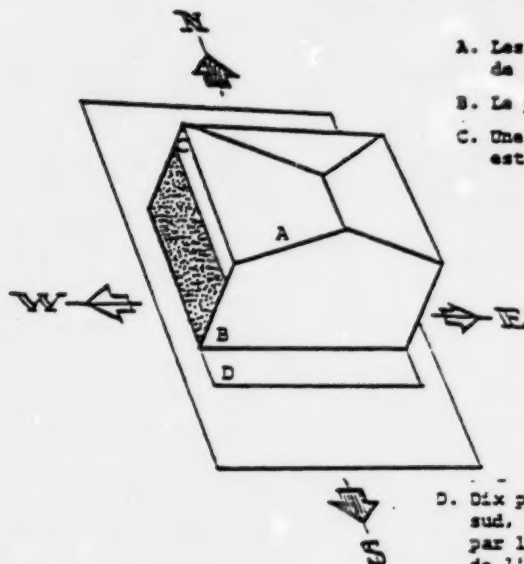


étape 5.:

Prolongez le plan vertical le long de la marge de recul à l'arrière, soit le côté sud du terrain, de sorte qu'il rejoigne les plans dessinés en 2, 3, et 4.

3. ÉTUDIEZ LES UTILISATIONS PASSIVES ET ACTIVES DE L'ÉNERGIE SOLAIRE RELATIVEMENT AUX "SURFACES PROTÉGÉES" DE VOTRE PROJET.

SURFACE PROTÉGÉE: Une surface exposée au soleil en raison de son emplacement au sein de "l'enveloppe solaire"



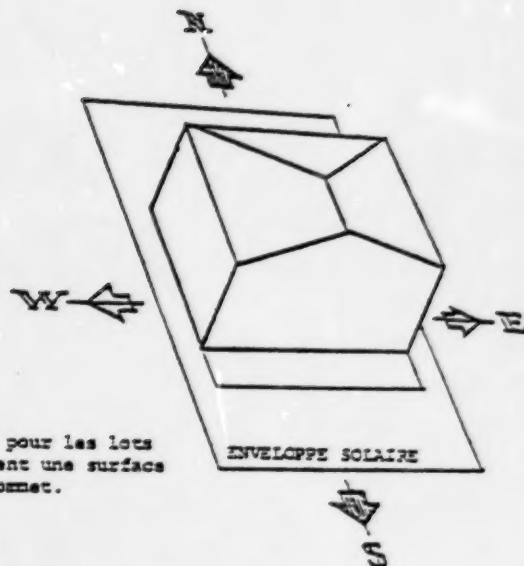
- A. Les plans horizontaux ou en pente du toit de l'enveloppe;
- B. Le plan vertical sud;
- C. Une bande de 100 cm de profondeur des plans est et ouest;

- D. Dix p. cent de la superficie du lot du côté sud, ou toute autre partie du terrain choisie par le propriétaire foncier et inscrite auprès de l'Urbaniste-chef de la politique énergétique qui sera dorénavant appelée le "jardin protégé".

EXEMPLES DE L'UTILISATION PASSIVE OU ACTIVE DE L'ÉNERGIE SOLAIRE

- grandes fenêtres du côté sud ;
- solarium ou serre du côté du "jardin protégé";
- puits de lumière, photopiles ou capteurs solaires;
- éclairage de claire-voie et chauffage solaire passif sur les bandes est et ouest afin d'atteindre les pièces qui se trouvent à l'angle nord-est ou nord-ouest du bâtiment et qui sont normalement froides et humides.

Au termes de l'arrêté municipal, toute "surface protégée" indiquée ci-dessus peut être aménagée en CAPTEUR SOLAIRE: une surface absorbante exposée aux rayons du soleil d'environ 60 cm sur 60 cm ou de 1 600 cm² de dimension qui recouvre une enceinte dans laquelle des dispositifs passifs ou actifs captent la chaleur et l'emmagasinent.



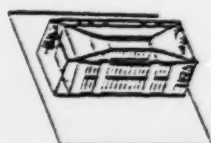
ENVELOPPE SOLAIRE TERMINÉE
(pour un emplacement type)

Nota: Les enveloppes conçues pour les lots
larges auront normalement une surface
plane horizontale au sommet.

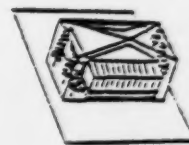
2. MAINTENANT VOUS POUVEZ CONCEVOIR VOTRE PROJET EN FONCTION DE LA FORME
DE L'ENVELOPPE SOLAIRE.



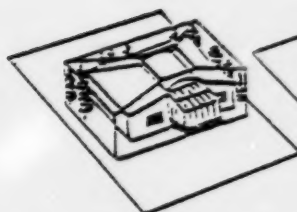
lot nord-sud



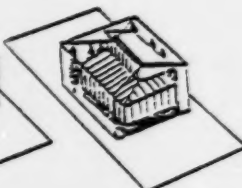
lot est-ouest



lot peu profond



lot large



lot étroit



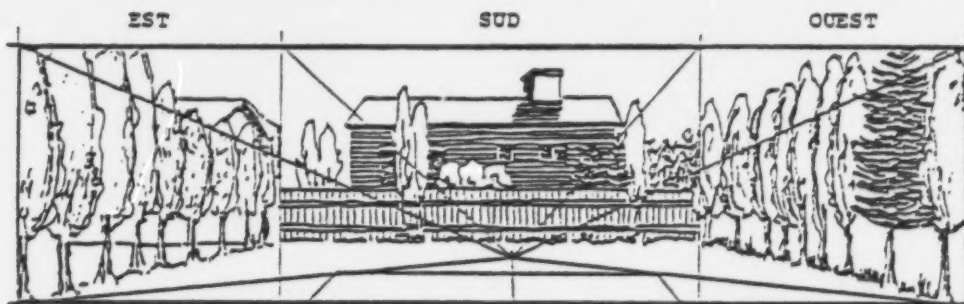
grand lot

4. ÉTUDIEZ LA POSSIBILITÉ D'ÉTABLIR LE "JARDIN PROTÉGÉ" DANS UNE PARTIE PLUS ENSOLEILLÉE DU TERRAIN, EN VERTU DES DISPOSITIONS DE L'ARRÊTÉ MUNICIPAL TYPE.

Si le côté sud du bâtiment principal ne reçoit pas au moins cinq (5) heures d'ensoleillement entre 9h et 15h, heure normale de l'Est, vous pouvez, aux termes de l'arrêté municipal, demander que le "jardin protégé" soit aménagé ailleurs.

Le but de changer l'emplacement du "jardin protégé" est d'assurer l'accès à l'ensoleillement là où les "surfaces protégées" A, B et C ne peuvent pas capter suffisamment de soleil en raison de constructions ou de la végétation existantes. Il ne vise pas à limiter la construction sur le terrain adjacent. Le droit à l'ensoleillement d'un "jardin protégé" restitué sera protégé en vertu d'un zonage ponctuel appliqué aux terrains contigus concernés.

5. PRENEZ DES PHOTOGRAPHIES ILLUSTRANT DE FAÇON CONTINUE LES CÔTÉS EST, SUD ET OUEST DU TERRAIN ET DES PROPRIÉTÉS ADJACENTES.



Debout dans le milieu de votre "jardin protégé", prenez des photos des côtés est, sud et ouest.

6. PRÉSENTEZ VOTRE PLAN CONCEPTUEL ET LES PHOTOGRAPHIES À LA SECTION D'APPROBATION DES PLANS D'EMPLACEMENT (7^e étage), EN INDICANT AVEC PRIORITÉ: CONÇU EN FONCTION DE L'ÉNERGIE SOLAIRE

POUR PLUS DE RENSEIGNEMENTS OU DES CONSEILS SUR VOTRE PROJET,
COMMUNIQUEZ AVEC:

L'URBANISTE-CHEF DE LA POLITIQUE ÉNERGÉTIQUE au 563-3000

EXPERIMENTAL APPLICATION
OF MODEL SOLAR ACCESS BY-LAW PRINCIPLES

April - July 1983

Introduction

On June 14, 1983, Ottawa Planning Committee received Information Report 0713-233/83 dated May 10, 1983, to the effect that Planning Branch was experimentally applying a set of Model Solar Access By-law principles, which had been derived by the Westboro Local Committee on Solar Access and refined by the Branch in the light of comment from various sources. The objective was to evaluate the impact of solar access protection on various aspects of development in the City. Compliance to these principles would be voluntary and an award of a SOLAR DESIGN PIONEER certificate would be made to applicants who submitted or modified their proposal to conform with them - see Attachment 2.

Method

Two types of experimental application were carried out:-

- i. Retrospective - i.e., on development proposals already permitted in April and May 1983.
- ii. Prospective - following remittance of a SOLAR DESIGN GUIDE which explained the principles, designers were invited to submit development proposals currently on their programme of work and conceived with 'solar in mind'. This application was carried out in June and July, 1983.

The sources for all proposals examined were the day-to-day submissions for Building Permit and Site Plan Control. Each proposal was analysed in terms of conformance by individual houses or other 'units of accommodation', classified by Land Use category and by the type of solar features incorporated - i.e., use of large windows on the south side, solar collector panels, south orientation of long façade, etc.. Finally, a cost/benefit analysis was attempted in very approximate terms to assess the administrative, economic, environmental and social impact of solar access protection.

Results

The experimental application involved the following total numbers of development proposals:-

Table 1: DEVELOPMENT PROPOSALS EXAMINED DURING THE EXPERIMENTAL APPLICATION OF SOLAR ACCESS PRINCIPLES

	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Total</u>
Applications for Building Permit (i)	262	316	275	185	1037
Site Plan Control Applications (ii)	53	46	55	55	209
TOTALS (A)	315	362	330	240	1247
Applications relevant to .....(i)	114	161	140	72	487
Solar Access Protection .....(ii)	17	5	14	11	47
TOTALS (B)	131	166	154	83	534
Proportion B/A as percentage	42%	46%	47%	35%	43%
Units of accommodation* .....(i)	136	678	177	193	1184
examined for Solar Access .....(ii)	69	519	493	81	1162
TOTALS	205	1197	670	274	2346
Retrospective Application (April and May 1983): 1402	Prospective Application (June and July 1983):				944

(i) Indicates Applications for Building Permit

(ii) Site Plan Control Applications

* Unit of Accommodation: Dwelling unit, commercial office, shop, school or factory.

Table 1 shows that 43 out of 100 applications received for Site Plan Control or Building Permit are likely to have some implication on solar access to the properties neighbouring the site subject to the application. This will effect the manpower requirements for administering solar access protection and will be commented in the Cost/Benefit Analysis below.

Table 2: CONFORMANCE WITH SOLAR ACCESS PRINCIPLES

Accommodation units-	APPLICATION				T O T A L	
	Retrospective		Prospective			
	(No.)	(%)	(No.)	(%)	(No.)	(%)
conforming fully:	755	53.8	651	68.9	1406	59.9
requiring slight change:	531	37.9	244	25.8	775	33.0
requiring major change:	116	8.3	49	5.3	165	7.1
TOTALS:	1402	100	944	100	2346	100

Comment: The most frequently required change or modification to achieve conformance during the retrospective application was re-orientation of the proposed building to make it face south. During the prospective application this changed to adjustments of the proposed volume.

Table 2 indicates that the majority of applicants, whether by design or pure chance, already respected the solar access requirements of neighbouring properties. The dissemination of information helped to improve the percentage of such applicants from about 54% to 69% and the adoption of regulations on solar access protection by the Council would no doubt help to improve conformance even further. The question is whether to make such conformance mandatory or voluntary in view of these findings? An Opinion Survey on this and related questions on solar access - see attached Questionnaire in English and French - produced the following results:-

Question 1: SHOULD CONFORMANCE TO A BY-LAW ON SOLAR ACCESS BE:-

	(Response) % in favour
A. Voluntary?	11.4
B. Mandatory?	46.3
C. Mandatory, if neighbours to the development object?	42.3 (Total: 100%)

Question 2: SHOULD A BY-LAW ON SOLAR ACCESS SEEK TO CONTROL THE SHADE

PRODUCED BY:-

A. Building proposals only?	54.3	
B. Tree and landscape proposals only?	6.7	
C. Proposed buildings as well as landscape?	39.0	(Total: 100%)

The response to Question 3 indicated that sunlight obstruction from large or tall structures was more objectionable to people than from houses, the least objectionable being the shade cast by a house extension. On the hand, homes (82.3%), apartments (81.7%), greenhouses (83.3%) and shops (85.7%) were most favoured for solar access protection. Protection for homes plus gardens - as stipulated in the model by-law during the experimental application and also in the GUIDELINES - was favoured by over 80% of the respondents.

Table 3: CLASSIFICATION BY LAND USE

	CONFORMING		REQUIRING CHANGE		T O T A L	
	(No.)	(%)	(No.)	(%)	(No.)	(%)
Residential	1352	60.0	902	40.0	2254	95.8
Commercial	4	10.2	35	89.8	39	1.7
Industrial	19	90.5	2	9.5	21	0.9
Other	31	95.9	1	3.1	32	1.6
TOTALS:	1406	---	940	---	2346	100

The classification of development proposals examined under the experimental application by land use indicates the dominance of the residential sector in solar access problems. The commercial sector shows only about 10% conformance and no doubt the downtown area of the City has already grown to a density of development, which precludes solar access protection for ever. A mandatory by-law would not therefore be feasible for that area at this stage of development, but a set of guidelines for voluntary conformance, coupled with incentives for such conformance could perhaps be successful. The industrial and educational sectors present least problems in solar access protection.

COST/BENEFIT ANALYSIS OF SOLAR ACCESS PROTECTION

A. Administrative impact

The workload to administer Solar Access Protection by-law in a city of 300,000 people may be estimated as follows:-

<u>Season</u>	<u>Skill</u>	<u>Full-time/Part-time</u>
Fall & Winter	Energy Planner	F.T.
	Building Inspector	--
Spring & Summer	Energy Planner	F.T.
	Building Inspector	P.T.
	Secretary	1 hr./day

The number of applications received for Building Permits was exceptionally high in Spring and Summer 1983. In the first half of 1983, the increase in the number of permits issued was over 50% (from 886 in 1982, to 1332 in 1983). The above estimate is based on a workload of 1000 applications in the first half of a year.

It may therefore be concluded that while in Fall and Winter an Energy Planner could be expected to cope with the number of permit applications - including occasional site inspection visits - in Spring and Summer, he should be able to rely on the part-time services of a Building Inspector or expect all area inspectors to obtain polaroid photographs of particular sites on his behalf.

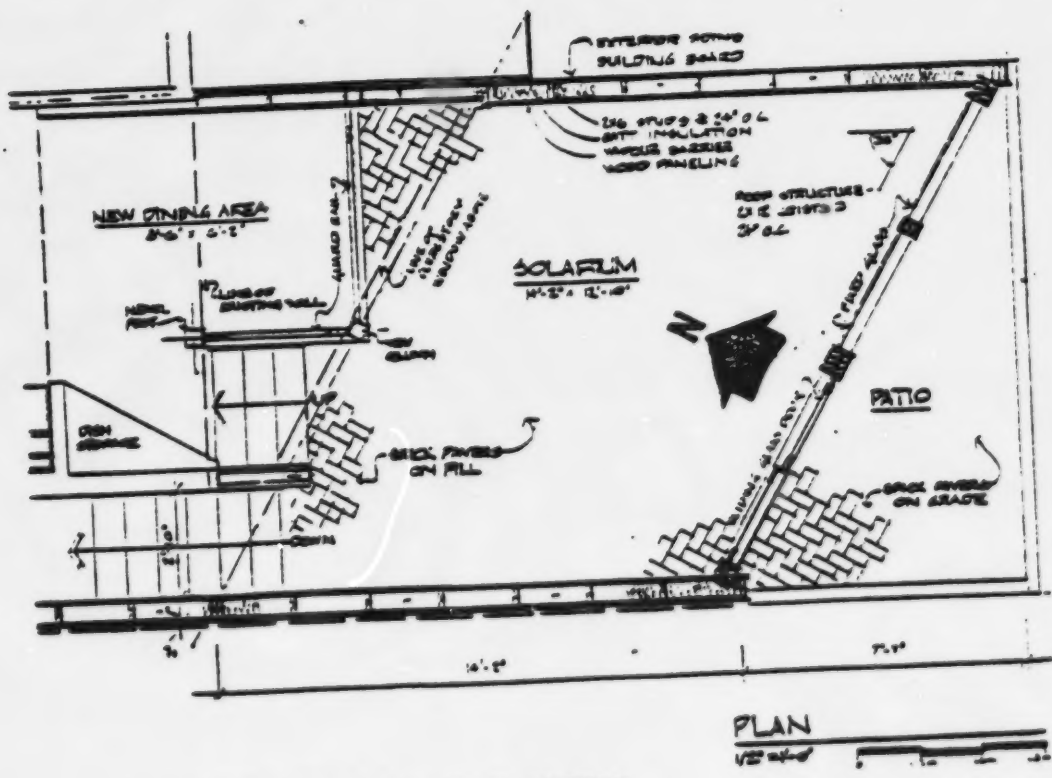
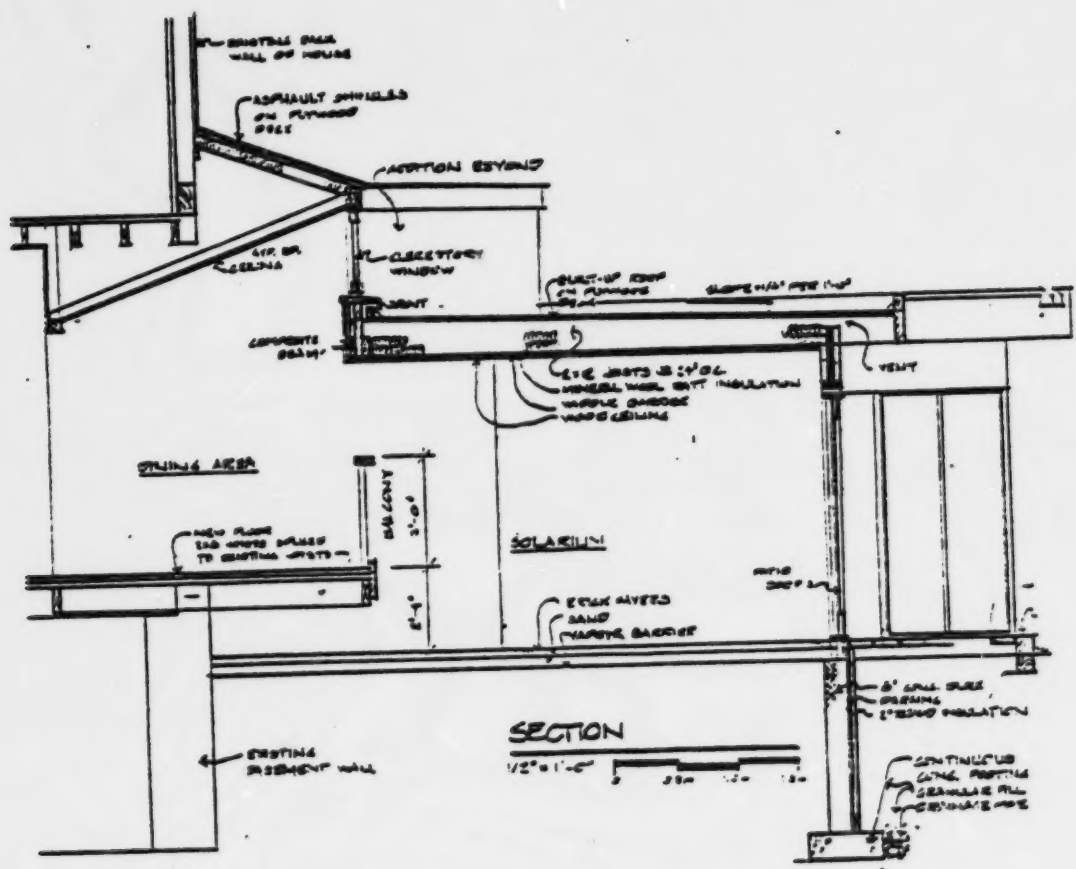
The use of computer software to project a solar envelope on a screen, in order to test whether a proposal conforms - as currently investigated by the Ontario Ministry of Energy - could reduce the examination time to about 10 minutes. This is not an excessive work load for a benefit which would have a permanent effect on a city - in terms of energy efficiency, urban design, an open and airy environment and civilized behaviour in building development.

8. Economic Impact

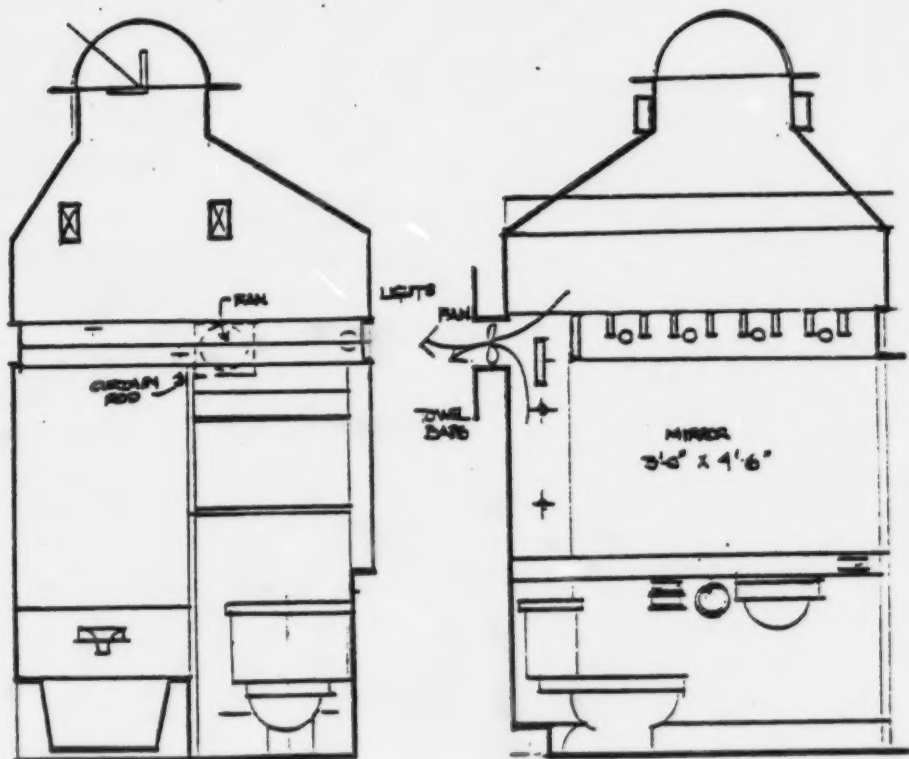
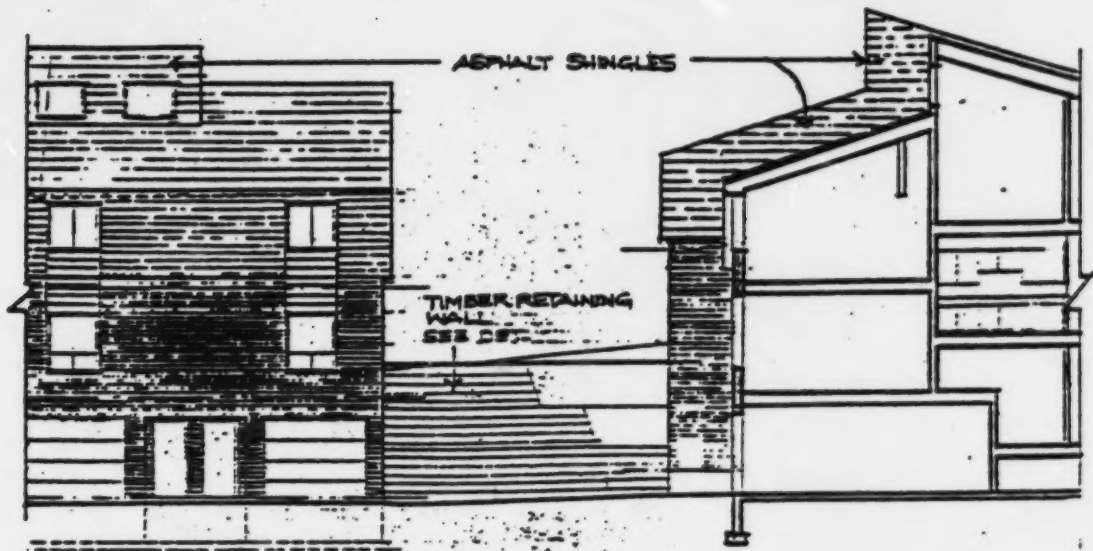
If the by-law had been mandatory, the 46.2% of proposals which did not conform - see Table 2, Retrospective Application, Accommodation units requiring slight or major change (37.9% + 8.3%) - would have been reduced in building volume by between 2% and 11% in order to conform. On the other hand, if the developer had accepted the idea of building a pyramidal form on a large site, rather than the traditional tower or slab block, an additional 26% to 32% of dwelling units would have been accommodated on the sites in question, though at 7% to 12% higher cost for foundations. The additional dwellings would amply compensate the developer for these costs and leave him a wider margin of profit than the "non-conforming" design.

There was no sacrifice in building volume or accommodation for proposals conceived with 'solar in mind' during most of the Prospective Application. This implies that given appropriate guidelines, imaginative designers would always come forward with solutions to satisfy both the client's requirements and the neighbours' expectations for solar access. Solar energy gains due to various design features incorporated in the proposals examined during the experimental application (Diagrams 1-5) were estimated to save between 8% and 21% of all energy bills for building owners and tenants, throughout the life of these buildings.

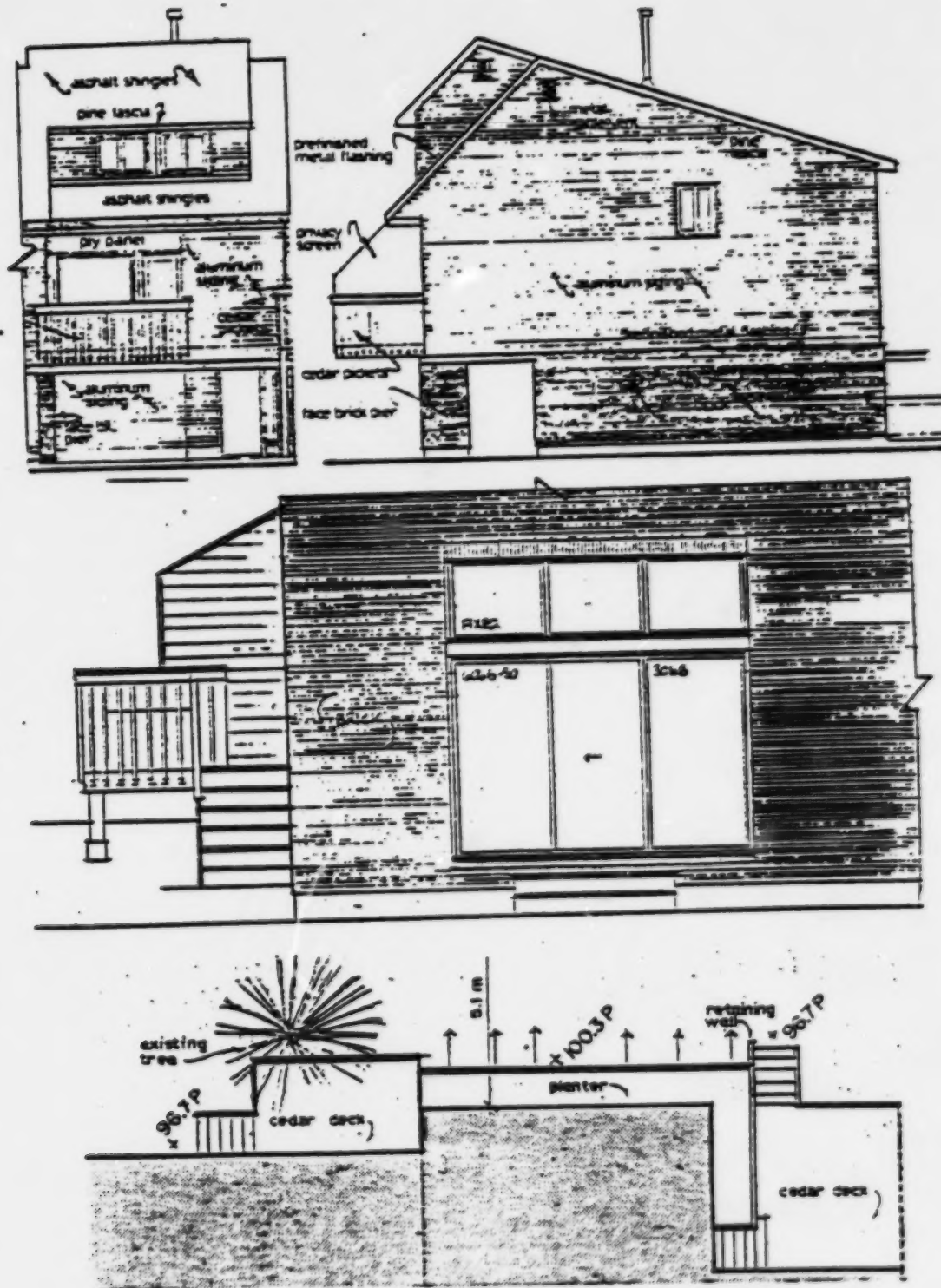
Evidently, much of the economic impact of the Solar Access Protection Principles was related to their effect on residential and commercial zoning. No adverse effect could be expected for areas in which up to 3-storey development was permissible, provided the orientation requirements for maximum solar gain were conformed with. This would be the case for the vast majority of residential and commercial areas in the City. Beyond 3 storeys, the adverse effect tends to increase with height, but on a parcel of land on which 20 storeys are permissible, few developers would come



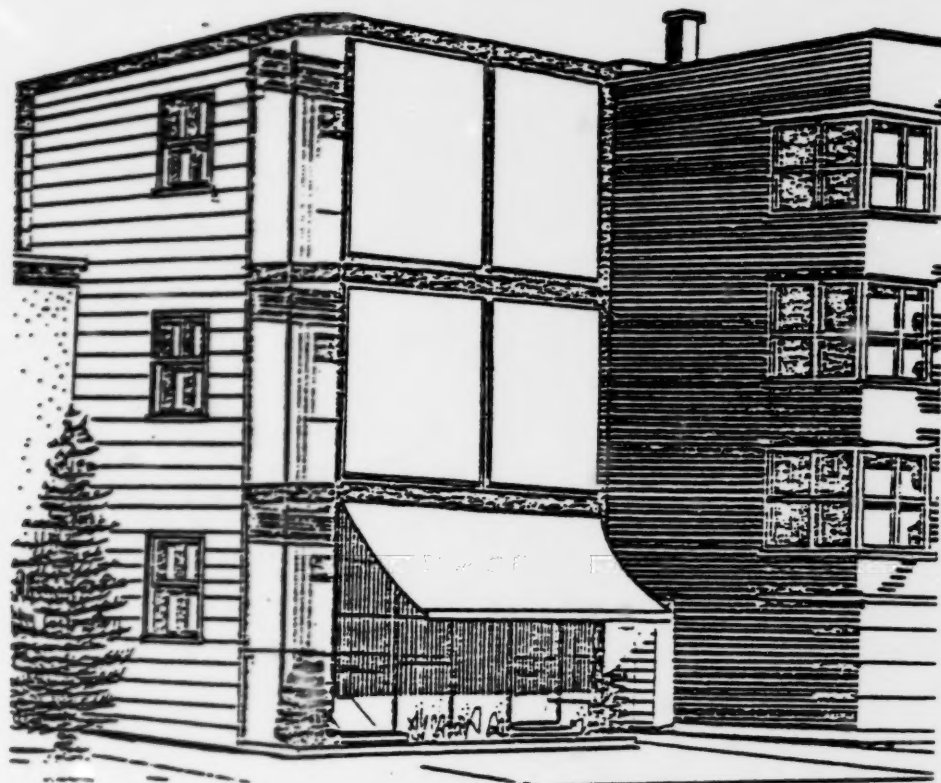
DIAG 1: SOLARIUM ON BOLTON STREET, LOWERTOWN



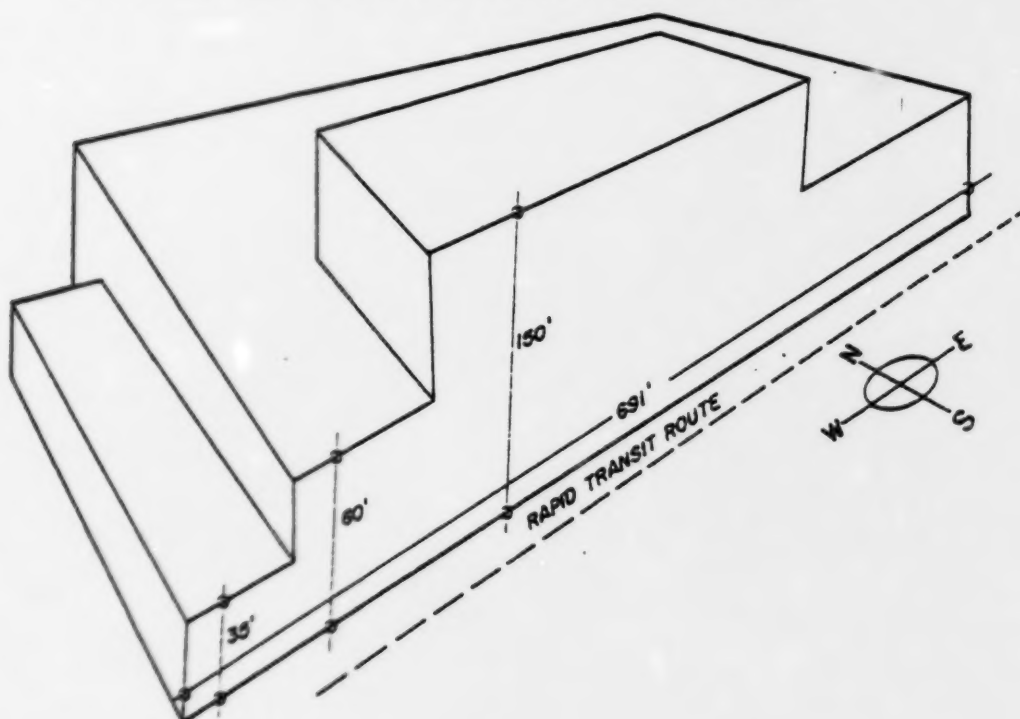
DIAG 2: SOUTH-LIGHT WINDOWS AND SKYLIGHTS



DIAG 3: SOUTH-FACING WINDOWS, PATIO DOORS, BALCONIES AND SUN DECKS



DIAG 5: THREE-STOREY SOLARIUM WITH PROVISION FOR SHADING IN SUMMER



DIAG 6: SUPER-ENVELOPE SUGGESTED TO DEVELOPER FOR A SITE IN WESTBORO

forward with a massive prism, using every cubic metre of the 'building envelope' defined in AZ-64. The usual proposal would be 2 or 3 tower blocks to allow for ventilation, parking, landscaping, etc. The solar envelope or 'super envelope' over the entire city block on the other hand (Diagram 6) allows a large pyramidal form, which is likely to accommodate more dwellings (26% to 32%, as indicated above) and yet be less objectionable to the neighbours.

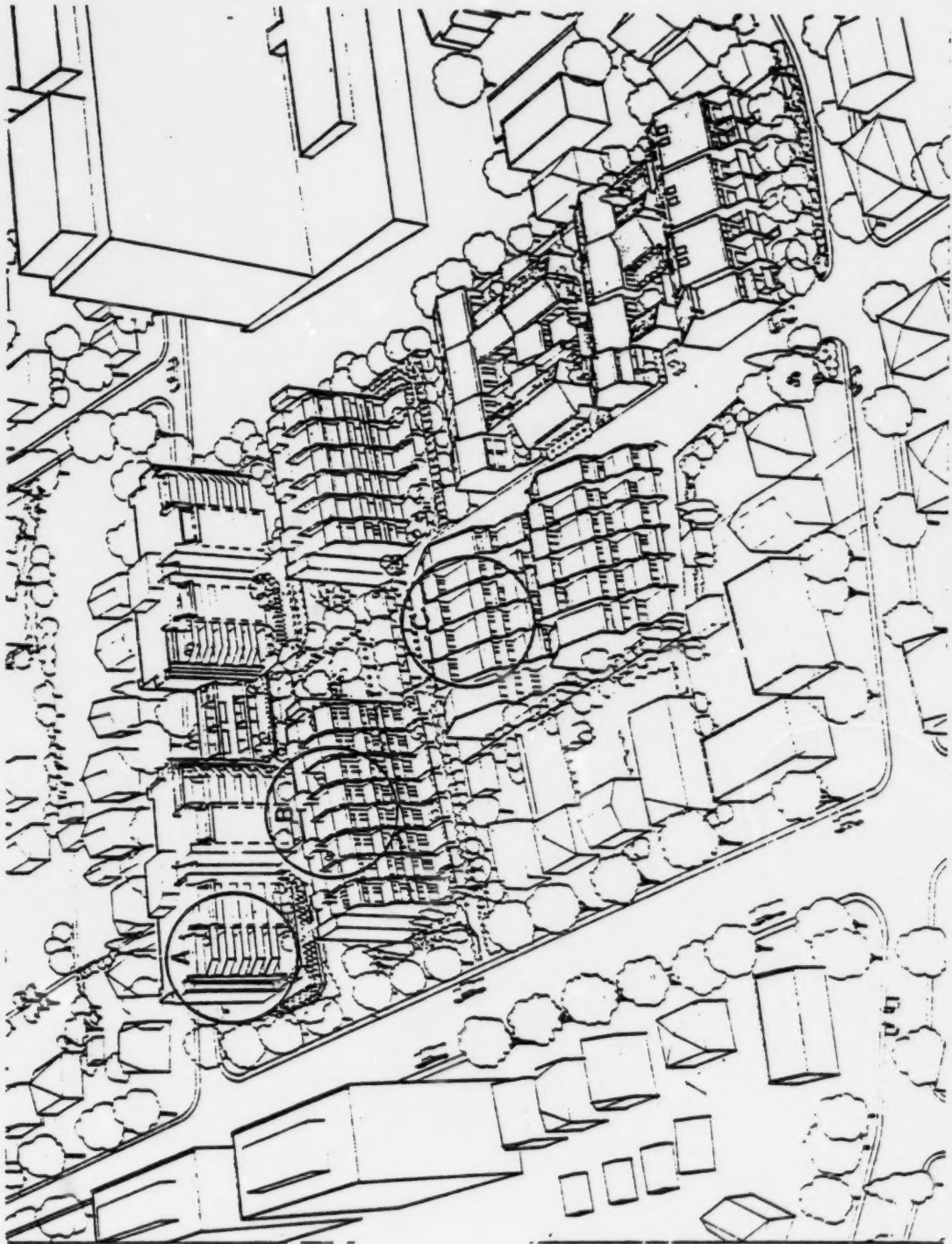
C. Social impact

The trial application of the by-law encouraged the residents neighbouring some major development proposals to be more vociferous in their objections to overshadowing, but there was no litigation. Application of the Principles did not result in any reduction of housing units, or any other adverse effect on community development, because conformance was only voluntary.

D. Environmental impact

There was no adverse effect on new or existing buildings, trees or streetscape. Once the Principles had been grasped by a designer or landscape architect, he could arrange the accommodation and trees he wanted without much sacrifice in building volume or landscaping. Streetscape was not affected because the Model By-law accepts all existing trees as non-conforming vegetation and affects only new trees. Careful selection of species in accordance with the Principles, could result in a 'habitat landscape' which keeps low-growth and deciduous vegetation on the south side of homes and allows evergreen trees on the north side. Coniferous trees could be planted to protect a home from adverse wind and weather, while deciduous trees could protect it from unwanted sunshine.

The provision of outdoor spaces landscaped and oriented for the enjoyment of sunshine (Diag 7) was one of the most exciting prospects for the urban environment in densely populated areas.



DIAG 7: EXAMPLES OF OUTDOOR SPACE ORIENTED SOUTH FOR THE ENJOYMENT OF, SUNSHINE. Housing at Putman Avenue. LINDENLEA. (A) Balconies; (B) Roof gardens (C) Terrace gardens

E. Implications for professional education

As conformance to solar access protection principles depends more on lot orientation than building design, an important conclusion of the experimental application concerns the education of land surveyors, urban planners and other 'subdividers' of the raw land for development purposes. Their education in the forthcoming age of scarce energy resources should lay emphasis on the self-evident fact that south orientation of a lot - i.e., east-west direction of streets - is the most important factor in the utilization of solar energy and the avoidance of shade on neighbouring properties in a city. Diagram 8 shows the only layout which ensured 100% conformance to the Solar Access Protection Principles experimented with - i.e., all proposed dwelling units faced South.

CONCLUSION

The experimental application of the Principles proved the feasibility of a voluntary measure to protect solar access in all but the downtown areas of the City. The cost/benefit analysis - even though approximate and qualitative, rather than quantitative - indicates that there are substantial and permanent net benefits to be gained by the official adoption of a solar access protection measure and the effort of the Local Advisory Committees on Solar Access has therefore been well worthwhile.

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DIAGRAM 3: HOUSING LAYOUT FOR SOLAR ACCESS.
TAPLOLA CRESCENT, GREENBORO

THE ORIGINS AND DEVELOPMENT OF SOLAR ACCESS PROTECTION PRINCIPLES IN OTTAWA

The idea of protecting solar access for properties in Ottawa was suggested in the course of neighbourhood studies in Ottawa South in 1977-78. The approved Ottawa South Plan 1979 included a recommendation to initiate a feasibility study for solar access protection and in March 1981, the Planning Branch issued Discussion Paper CD-164-6 titled PLANNING MEASURES TO SAFEGUARD SOLAR ACCESS FOR PROPERTIES IN OTTAWA. The simplest method of legally establishing this access in Ottawa was considered in this study to be through the modification of existing zoning and of specific requirements affecting developable space and landscaping in and around a lot.

On October 7, 1981, City Council approved an application to the Ontario Ministries of Energy and of Municipal Affairs and Housing for a grant of \$25,000 under the Energy Conservation Through Land-use Planning Program to complete research already in progress in the Branch, on the subject of 'SOLAR ACCESS PROTECTION IN BUILT-UP AREAS'. A favourable response to this application was received from the Ministry in January 1982.

In late January and early February 1982 public meetings on solar access protection were held in Capital Ward and Westboro and committees of local residents were set up to draft appropriate provisions for each area. Capital Ward Committee opted to establish provisions to enforce solar access protection as a property right, while Westboro Committee opted for a zoning amendment to AZ-64, to ensure such protection. Proposals were ready by April 28, 1982, when they were discussed at a public meeting with legal and other experts assembled at the Glebe Community Centre by the Solar Energy Society of Canada Inc. and the City of Ottawa. The comment received at this meeting, persuaded the Westboro Committee to present their proposals to the residents of that area.

This presentation took the form of a public awareness campaign on solar access protection, involving publicity on television and newspapers, an exhibition on Sun Day 1982, a mobile visual display, two opinion surveys in Westboro and a public meeting to discuss the results of these surveys at Westboro Community Centre.

The first opinion survey involved the distribution of a two-page statement and questionnaire on the proposed provisions for solar access to some twelve hundred (1200) households in Westboro. A response was received from five hundred and eighty six (586) households, with eighty five point nine (85.9%) percent expressing an opinion in favour of the principle of solar access protection, five point nine (5.9%) percent against and eight point two (8.2%) percent being undecided.

The second opinion survey involved a more detailed survey form, as requested by some three hundred (300) residents. It presented respondents with all the options that confronted the Westboro Committee in drafting the provisions. A total of one hundred and twenty-eight (128) responses were received and the results indicated that in nine (9) out of twelve (12) propositions, the majorities in favour ranged from sixty point nine (60.9%) percent to one hundred (100.0%) percent. In the remaining three (3) propositions, opinion ranged from a slight majority in favour, to ninety (90.0%) percent opposition. At the public meeting on July 8, 1982, the Committee provided more detailed explanations or compromised in favour of the views expressed by the respondents on the above mentioned three (3) propositions.

The resulting principles were circulated to all Departments in City Hall and constructive input was received from Legal Department, Zoning Operations Division in Buildings Branch, Current Operations Division in Planning Branch and from Non-Profit Housing. In the second round the circulation comprised all

Technical Agencies in Ottawa and the Regional Municipality of Ottawa-Carleton (utilities, commissions, professional associations, research councils, CMHC, CIDC, OBE and Public Works Canada). In the final circulation, comment was requested from community leaders and community associations in Ottawa, headquarters of Ontario Ministries related to energy and the environment, national institutes, lawyers specializing in environmental and solar access matters, selected municipalities prominent in energy conservation and members of all Advisory Committees on Solar Access Protection in Ottawa. The response was mostly positive and offered advice on various technical aspects.

All comments received were critically examined by Planning Branch and valid points were incorporated in the principles shown in Attachment 1.

Summary of the stages in the development of the Model Solar Access By-law: -

- | | |
|-------------------------|---|
| Stage | 1: Recommendation to initiate a study on the feasibility of solar access incorporated in Ottawa South Plan, 1979. |
| | 2: Application for an ECTP research grant to complete studies. |
| | 3: Development of principles by Westboro Advisory Committee on Solar Access. |
| | 4: Circulation to various agencies for comment. |
| | 5: Information Report to Ottawa Planning Board on trial application to monitor performance of principles. |
| | 6: Report on monitoring study to Council and re-formulation of By-law as Solar Design Guidelines. |
| <u>(CURRENT STAGE):</u> | 7: Approval of SOLAR DESIGN GUIDELINES. |
| | 8: Implementation. |

COMMENT RECEIVED AND RESPONSE

The preceding report, GUIDELINES and 4 Attachments were sent to over 70 experts, organizations, community representatives, institutions, associations and research establishment for comment, as shown in the Distribution List below. Table 1 in this Attachment summarizes the comment received and the response - in terms of modifications to the draft - to make the proposal more workable.

DISTRIBUTION LISTA. External

Regional Municipality of Ottawa-Carleton
Regional Municipality of Hamilton-Wentworth
National Capital Commission
City of Halifax
Commercial and Industrial Development Corporation
Ottawa-Carleton Regional Housing Authority
Ontario Housing Authority

Ottawa Hydro Electric Commission
Ontario Hydro
Ottawa Gas
Bell Canada
Ottawa Cablevision Ltd.
Skyline Cablevision Ltd.

Energy Mines and Resources
National Research Council of Canada
Canada Mortgage and Housing Corporation
Public Works Canada
Ontario Ministry of Municipal Affairs and Housing
Ontario Ministry of Energy

Solar Energy Society of Canada Inc.
Carleton School of Architecture
Ottawa Board of Education
Ottawa Separate School Board

Canadian Institute of Planners
Association of Professional Engineers of the Province of Ontario
Ottawa Association of Architects

16 Community Associations

9 experts, consultants and designers related to solar energy

All members of Westboro, Glebe and Ottawa South Solar Access Advisory Committees.

B. Internal

City Solicitor

City of Ottawa Non-Profit Housing Corporation

Community Development Department
Buildings Branch
Economic Development Branch
Planning Branch
Community Planning Services Division
Land Use and Development Division

Physical Environment Department
Property Branch
Architectural Division

City of Ottawa Design Committee

Committee of Adjustment

Table 1: ALTERATIONS IN RESPONSE TO COMMENT RECEIVED

TEXT AS CIRCULATED	COMMENT RECEIVED	RESPONSE TO COMMENT
<u>RECOMMENDATION</u> 1. That the Solar Design Guidelines shown in Attachment 1 be <u>APPROVED</u> for implementation. (No recommendation for review of provisions)	A. REPORT: page 1 "On p.1, Recommendation 1, we would suggest that works similar to "as voluntary compliance tool" be added to the statement." "The remedy proposed in the case of disputes ... seems particularly weak."	<u>RECOMMENDATION</u> 1. That the SOLAR DESIGN GUIDELINES shown in Attachment 1 be <u>APPROVED</u> as a voluntary conformance instrument. 3. That there should be a review of the performance of the SOLAR DESIGN GUIDELINES after a year's application.
<u>OPTIONS</u> Enact a by-law... (No second option mentioned)	"On p. 2, we would suggest that two options be listed - the one stated and a second, which is the voluntary compliance route."	As a matter of style, only the options rejected are supposed to be listed in Ottawa Council Reports.
An important disadvantage of the recommended approach is that the neighbours will have no legal recourse. This places the onus on staff to ensure protection through persistent negotiation.	"The statement that "persistent negotiation" will be used... would appear to suggest that the operating philosophy is something other than entirely voluntary."	Reference to "persistent negotiation" eliminated - see p. 3.

Page 2

Page 3

TEXT AS CIRCULATED	CURRENT RECEIVED	RESPONSE TO COMMENT
(No mention made of land use policies or "Conservation Pipeline" articles to maintain public awareness on solar access protection).	"Two additional items of implementation which we suggest warrant consideration as part of the package are: - (a) maintaining to the group responsible for official plan review; (b) maintaining a public awareness on solar access protection through advertising in "Conservation Pipeline".	Both these items have been included - see p. 3 of the Report, items (a) and (b).
<u>B. SOLAR DESIGN GUIDELINES: page 4</u> Intensity of heat received from the sun - a mere 116 BTU per square foot of the earth...	"It would be better to use metric units throughout the document."	In view of the current transitional stage and a recent court decision, both metric and imperial have been shown - i.e., 1.3 megajoules or 116 BTU.
<u>Page 5</u> Active and passive solar systems defined in the same paragraph.	"These two systems should be more clearly differentiated" "It is commonly agreed upon that some assistance from a mechanical device can be used (in a passive system)."	ACTIVE and PASSIVE have now been defined in DISTINCT paragraphs and assistance by a mechanical device allowed for in the latter - see p.5.
<u>Page 7</u> (No reference made to National Research Council publications, No illustration of the SKYWINDOW concept)	"Refer to NRC's SOLAR WORKBOOK and SOLAR PRIMER." "Illustrate SKYWINDOW concept"	Additional paragraph on p. 7 responds fully to these two comments. Diagram 2 extended and SKYWINDOW included in Definitions.

TEXT AS CIRCULATED	COMMENT RECEIVED	RESPONSE TO COMMENT
"designers may consider tracking mechanisms which may rotate to face the sun always at 90°."	"Such mechanisms are not financially viable"	Words added to make allowance for future development - i.e., "Whenever it appears financially viable, designers may..."
<u>Page 17</u> A viable alternative is the use of EUTECTIC SUBSTANCES.	"phase change materials are very rarely economic. A 125 gallon reservoir of phase change material in a basement is surely, not common."	The word "viable" was eliminated and the words "according to experiments" added in the phrase on p. 17.
<u>Page 18</u> "It is proposed that this 'building envelope' be modified."	"...the paragraph should be amended to clarify that no amendment to AZ-64 is intended at this time."	The words "it is proposed that" were eliminated.
<u>Page 19</u> (Diag. 9 for level and sloping sites)	"will the envelope be modified by the local contour lines?"	Step 1 for the sloping sites has been exemplified in the Diagram.
<u>Page 20</u> (B. APPLICATION - no reference to Committee of Adjustment).	...add paragraph:- "If compliance with the GUIDELINES results in a minor deviance from the requirements of AZ-64, an application can be made to the Committee of Adjustment for a variance from the provisions of AZ-64"	Paragraph added - see second part of APPLICATION.

TEXT AS CIRCULATED	COMMENT RECEIVED	RESPONSE TO COMMENT
<u>page 21</u> Diagram 11 and notes on the "Protected Garden"	"the concept of the protected garden is unclear"	Objective 1 and 2 added on p. 21 to explain the need for protected gardens. Diag 11 and notes stipulate the location, size and orientation of this garden.
<u>page 22</u> (No stipulation 'of location' for solar collectors)	"A homeowner who is installing a solar collector and who has trees growing on the south side of his property, should know that eventually these trees are going to obstruct some of his sunshining and, therefore, should proceed on his own risk."	Note added on p. 22: - "The location of a collector should be determined with due consideration of the distance, foliage characteristics and rate of growth of any existing vegetation in the vicinity."
<u>page 23</u> (Maple tree called "Indus(rable)")	"It is questionable that the maple, as Canada's National Symbol, should be banned."	Maple tree eliminated from list.
<u>page 24</u> (No restriction imposed on trees to be planted for shading one's own garden).	"If (the owner) wants to plant trees to shade his own property, he should be allowed to do so."	Paragraph (vii) added on p. 24 to emphasize the property owner's freedom.
<u>pages 26-32</u> (No flow charts included to explain procedures, as the application of the GUIDELINES would be voluntary).	"We would suggest that an outline of the processing procedure be spelled out."	Section 3 added to the GUIDELINES, giving 7 flow charts. These may prove to be intimidating to some applicants and they therefore remain subject to review.

TEXT AS CIRCULATED	COMMENT RECEIVED	RESPONSE TO COMMENT
page 35 (SKYWINDOW not included in Definitions)	"Concept of the SKYWINDOW should be discussed and "illustrated."	Definition given on p. 35, following illustration on Diag 2 (p. 8).
page 36 REFERENCES	"Include SOLARIUM WORKBOOK and SOLARIUM PRIMER"	Eight publications of the National Research Council and 4 other relevant publications included in REFERENCES.

Number/ Numéro

2

ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING
ONTARIO MINISTRY OF ENERGY
CITY OF OTTAWA

SOLAR ACCESS
PROTECTION FOR
BUILT-UP AREAS

APPENDICES



City of
Ville d'Ottawa

January 1984

ACKNOWLEDGMENTS

An early step in the long procedure to establish the feasibility of solar access protection in built-up areas and to develop a process by which it may be enacted by a municipality, was to set up local Advisory Committees on Solar Access. The Westboro Committee, among them, developed a method of working as a team of local experts, which is believed to open new in-roads in participatory planning. A debt of gratitude is acknowledged to all members of this Committee, as follows:-

Professor Peter Fitzgerald

Mr. David MacKay

Ms. Agnes MacIntosh

Mr. Chuck Jackson

Mr. Don Smiley

Mr. Fred Lambert

Ms. Betty MacKay

Special thanks are due to Mr. Glenn Tunnock, MCIP, who supervised this study on behalf of the Ministries of Energy and of Municipal Affairs and Housing.

Gary Armen

Senior Energy Planner

City of Ottawa

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APPENDICES

CITY OF OTTAWA
COMMUNITY DEVELOPMENT DEPARTMENT
ENERGY PLANNING

PLANNING MEASURES
TO SAFEGUARD SOLAR ACCESS FOR PROPERTIES
IN OTTAWA

DISCUSSION PAPER CD-164-6

MARCH 1981

APPENDIX 1

000284





OTTAWA
2000-0000-0000-0000

OTTAWA

CITY HALL
111 SUSSEX DRIVE

HÔTEL DE VILLE
111, PROMENADE SUSSEX

K1N 5A1

ROBERT BAILEY
COMMISSIONER-COMMISSAIRE

IN REPLY PLEASE QUOTE
EN RÉPONDANT CITEZ CETTE LETTRE

SOLAR ACCESS FOR PROPERTIES IN OTTAWA

Summary of Discussion Paper CD-164-6

The City's draft Energy Conservation Policy, now awaiting Council approval, consists of the following goals:-

1. Increase the awareness and promote the co-operation of the public in energy conservation;
2. Amend the Official Plan and promote energy-efficient planning;
3. Increase the efficiency of transportation and reduce its dependence on non-renewable energy sources;
4. Extend and publicize conservation in the public sector, to set an example for the private sector.

The protection of solar access for buildings in order to allow their owners to utilize the energy reaching us continually from the sun, is an aspect of Goal 2 and the objective of this study is to explore the options available, to establish a simple way of regulating such access and investigate some likely impacts of solar access regulations. The underlying assumption is that the largest possible number of energy consumers should have the opportunity of utilizing the abundant energy of the sun, because with nearly 2000 hours of sunshine per year, Ottawa is more fortunate than Windsor and Vancouver in this respect.

The case in favour of solar access protection rests first and foremost on the considerable savings likely to accrue to householders in retrofitting an existing home in the Glebe, Ottawa South or Westboro - the areas on which the study is focussed for solar access applications. Over a five-year period, the installation and running costs of a solar heating system show a saving of some \$4,200 over equivalent costs for an oil system. Solar access protection would encourage a householder to invest in this type of retrofitting without fear that his expensive solar collectors would be continuously under the threat of being overshadowed by a new structure or some vegetation growing in their vicinity. In accordance with the location of collectors, there are four levels of solar access protection, as follows:-

- 1) **ROOFTOP SOLAR ACCESS PROTECTION:** The simplest and least controversial, because in a residential area of say, 2-storey houses the possibility of conflict between adjacent homes obscuring each other's rooftop solar collectors is minimal.
- ii) **SOUTH WALL SOLAR ACCESS PROTECTION:** This may necessitate lower residential densities, or specially designed roof and house shapes to protect the solar access space available to a neighbouring house.

- iii) SOLAR ACCESS PROTECTION FOR PARTS OF A LOT allows the installation of solar collectors at ground level. This is obviously a more stringent requirement as the safeguarding of access space all the way to the ground surrounding a neighbour's house, necessitates a large lot, a distant position and perhaps even a special roof or building shape for a house. All these requirements obviously spell more dollars and cents.
- iv) SOLAR ACCESS PROTECTION FOR ACCESSORY BUILDINGS allows the installation of solar collectors on garages and other outbuildings. This may appear to be less critical until one considers greenhouses, which may become an important source of fresh food for a household in the future, as food becomes increasingly more expensive.

Each of these may suit a different area of the City in accordance with 8 factors enumerated in the study - (i) and (ii) above for example, appear to be suitable for most of the Glebe; (i), (ii) and (iii) for most of Ottawa South; but for Westboro the choice is less clear. An important factor in the choice of protection level is likely to be the reaction of citizens. The case in favour of protection is concluded with the enumeration of potential indirect benefits of solar access protection: Employment growth and diversification, encouragement to innovative designers, more variety in the urban scene, etc. The simplest method of legally establishing the 'right to light' is considered to be SOLAR ACCESS ZONING to overlay existing land use zones in the city with some new requirements affecting building height, bulk, location, landscaping, etc.

The case against solar access protection consists of social, political, economic, environmental and legal arguments. 'Blanket' zoning may not be considered fair, for example, because certain locations are more advantageous than others and this may give rise to disputes among neighbours. Politically, solar access protection may compound and perpetuate existing inequities in land ownership and be used as an instrument for extracting more taxes. Restrictions in development imposed by solar access zoning will certainly affect employment prospects in the building industry and the effect on the urban environment and vegetation may be quite profound: incongruent shapes and surfaces, vandalized solar collectors, lopped trees and dwarf bushes, etc. As a legal means of ensuring solar access, zoning may be simple, but in its day-to-day application, it could well give rise to disputes and delays and thus procrastinate the development control process.

The controversy as to whether solar access for buildings should be legally protected, may be resolved only through public debate and no preference is therefore indicated in the study. It is proposed to discuss the pros and cons and the suitability of various levels in solar access at a series of public meetings in the Glebe, Ottawa South, Westboro and elsewhere, in order to increase public awareness and gauge community feeling on the matter. Comments and summaries of the discussions held in these communities will subsequently be submitted to the Council, together with any recommendations for future action.

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Executive Summary

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A. SUBJECT

PLANNING MEASURES
TO SAFEGUARD SOLAR ACCESS FOR PROPERTIES
IN OTTAWA

Discussion Paper CD-164-6

B. BACKGROUND

1.0 Reasons for the study

The continual rise in the cost of energy, coupled with the urgent need for a transition in our reliance from non-renewable fossil fuels to renewable energy sources, make it imperative for the Council, as the tier of government most closely related with the collective needs of people at local level, to consider measures for the conservation of energy and for the utilization of energy sources available in the region. The Council's Energy Conservation Policy consists of the following goals:

1. Increase the awareness and promote the co-operation of the public in energy conservation;
2. Amend the Official Plan and promote energy-efficient planning;
3. Increase the efficiency of transportation and reduce its dependence on non-renewable energy sources;
4. Extend and publicize conservation in the public sector, to set an example for the private sector.

One aspect to be dealt with under Goal 2 above is the question of solar access for buildings. The low, but continuous radiation of energy from the sun is one of the most abundant alternative sources to oil and with the growth of solar technology, it could satisfy some of our needs, particularly in space and water heating. The means available for the exploitation of solar energy tend to be rather expensive at present, but it is expected that further innovation, mass production and competition between solar product manufacturers, will soon bring this technology within reach of most households in Canada. In the meantime, we should perhaps consider the question as to whether solar access should be safeguarded for every household and what problems arise in such protection being created as an extension of legal rights. Other aspects include the social impact it may have in terms of relations between neighbours and the economic impact on construction activity and employment in a region.

The objective of this study is first to explore ways and means of ensuring access to solar energy for every building, secondly to establish the least complicated way of regulating such access and finally to gain an understanding of the possible social and economic impact of problems related to solar access. At this preliminary stage, it is meant to stimulate discussion on the opportunities and responsibilities implicit in solar access protection, rather than make any recommendations to the Council.

The origins of this study may be traced back to January 1980, when elected City Hall officials and staff attended the CITIES' ENERGY CONFERENCE in Toronto. Following this conference, a number of Community Development issues were identified in Report No. 0833-079/80, dated February 8, 1980 and addressed to the Planning Board. The need to protect solar access was one of the issues identified in that report and the same need was mentioned in the Development Plans for Westboro and Ottawa South. These two areas together with Glebe will be referred to in this study to illustrate the problems that arise with overshadowing in various seasons and times during the day and to derive possible solutions and measures for the protection of solar access.

The study as a whole will be used as background material for discussions to be organized at community centres in the above-mentioned three areas and elsewhere in the city, in order to increase public awareness on the subject, ensure a wide involvement of the public in the debate for or against solar access protection, assist technical committees in the formulation of solutions and to obtain wide-ranging comment on any measures for such protection as may be submitted to the Council for approval.

C. RATIONALE

1.0 Why Solar Access

As outlined in the Background , solar energy could be expected to play an increasing role in the satisfaction of our energy needs in the foreseeable future. At present, the only economically viable application of solar technology may be for water heating and passive solar space heating, but all indications are for increasing technological developments in the field, as a natural reaction to the increasing costs of oil and other non-renewable sources of energy.

In order to allow the largest possible number of energy consumers to benefit from the increasingly cost-effective applications of current and foreseeable solar technology, it would be prudent for a municipality to consider measures for the timely protection of solar access to every building in its area. Protection at this early stage in the development of solar technology would be a stimulus for the growth and diversification of its products, for the retrofitting of older homes, for the construction of new 'solar' homes, for the development of novel approaches in architectural design, but above all, for the proliferation of the energy conservation effort to every household and firm requiring built accommodation in an area. On the other hand, however, the prohibition of building above a certain height in relation to surrounding structures, the limitation in shape of building, the ban on trees and the

curtailing of plant growth to safeguard solar access for a neighbouring building, could all have adverse effects on the environment, economic development and social life of an existing city. The remaining parts of this report will therefore be given to a discussion of the pros and cons of solar access protection, in order to stimulate individuals and organizations to develop their own arguments and proceed towards a full consideration of the matter, before a decision is reached and the appropriate safeguards are established.

D. THE CASE IN FAVOUR OF SOLAR ACCESS PROTECTION

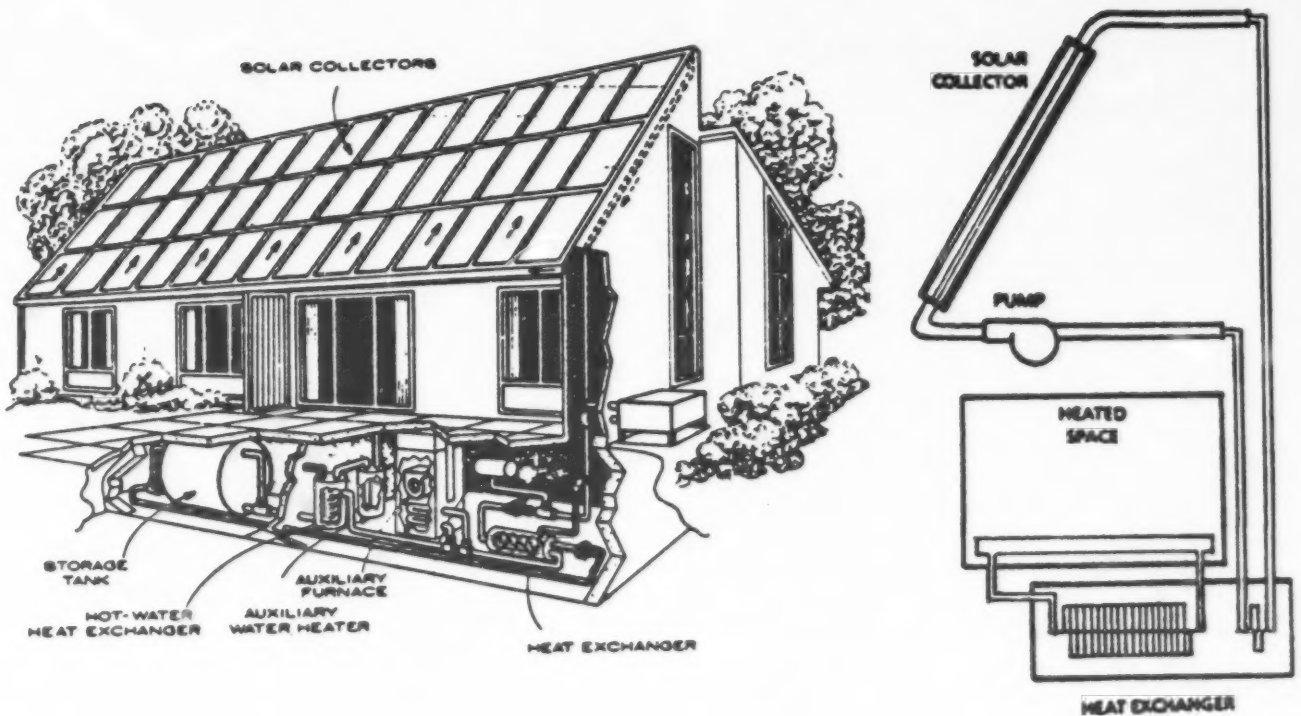
1.0 Scope

The arguments in favour of safeguarding access of the sun to all buildings in an existing city like Ottawa will progress from the benefits of the sun as a source of energy to the foreseeable economic benefits of growing solar technology. Subsequently a number of options in the extent of solar protection will be developed and the legal means for the implementation of each will be considered. Throughout this discussion, the areas which will be referred to for the application of various concepts will be the neighbourhoods of Glebe, Ottawa South and Westboro.

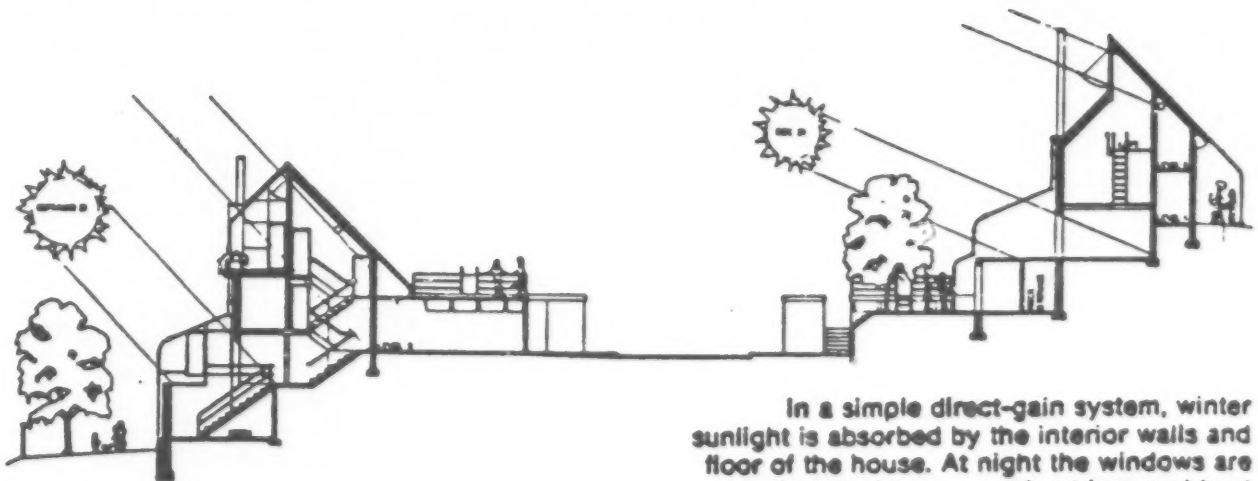
2.0 The Sun as a Source of Energy: Can we afford to ignore it?

The sun is estimated to be some 8 to 10 billion years old and it is expected to keep burning for at least another 4 billion years. It produces energy in the form of radiated heat, light - and probably sound - at a distance of 90-96 million miles from the earth, by means of continuous thermonuclear fusion at the rate of some 4.7 million tons of matter per second. The energy received on earth is in the form of:

- (i) infrared rays which have long wave-lengths and produce heat; and
- (ii) in the form of short wave ultraviolet rays which give us light.



ACTIVE SOLAR HEATING SYSTEM



PASSIVE

Architects:
J. Somfay and J. Fryett

In a simple direct-gain system, winter sunlight is absorbed by the interior walls and floor of the house. At night the windows are shuttered to prevent heat loss and heat radiates from the floor, etc., to warm the living space. In summer the windows are kept closed and shaded during the day and are opened at night to allow cool air to circulate. Roof overhangs designed to intercept the high summer sun but not the low winter one, shades and deciduous trees can be used to shade windows.

Fig. 1: ACTIVE AND PASSIVE SOLAR HEATING SYSTEMS

Both infrared and ultraviolet rays release also some electromagnetic radiation which so far only satellites in outer space have been able to use economically. The sun directly influences also all other natural sources of renewable energy - winds, tides, rain and geothermal forces - which we have only just begun to wonder how to use.

After a dissipation of some 73% of solar radiation in the atmosphere, an average of 1400 BTU's of heat are received on every square foot of the surface of the earth. This is equal to what a large hydro-electric plant may produce at the same rate. This heat may be harnessed through ACTIVE or PASSIVE SOLAR HEATING SYSTEMS (Fig. 1) which may be defined as follows:

ACTIVE SOLAR HEATING SYSTEM: A system which collects and transforms solar radiation into usable heat by reliance on mechanical means or a chemical process.

PASSIVE SOLAR HEATING SYSTEM: A system which collects solar radiation through windows and other heat conductor surfaces, in order to store it in the form of heat in massive parts of a structure - e.g. concrete walls, roof and floor slabs etc. - and subsequently release it to surrounding fluids, to heat air or water through convection.

Both these types of solar heating are being continually improved to absorb a larger proportion of the heat received from the sun and minimize heat loss.

The low intensity, but continuous energy of solar radiation is reaching the surface of the earth in more than sufficient quantities to heat a home and provide for its hot water needs during the day. It has in fact been estimated that all current energy needs in North America could easily be met from solar energy falling on only 1% of the total land surface (Hellman, 1973). It is free energy, non-polluting and unlimited - for at least another 4 billion years. The greatest challenge is technological - how to collect, store and use this energy, during the periods of the day or the year when the sun is totally or partially absent.

Although it is possible to concentrate solar rays with sophisticated equipment to derive high intensity energy, the cheaper, low intensity energy collected by passive and most active systems is particularly suitable for space and water heating. Both air and water are fluids and can be heated by conduction, convection and radiation, all of which may be initiated by the sun. By contrast, the high quality, rapid-output energy sources like oil and electricity, rely on one or two of the above-mentioned heat transfer processes at a time and they are more suitable for intense or concentrated energy needs. It would only be common sense therefore, to avoid the use of high intensity energy for low intensity needs - like space and water heating, which could best be met by the sun.

The legal protection of solar access would be the first step in promoting this sensible approach to energy use.

3.0 The Feasibility of Solar Energy Utilization in Ottawa

It may be argued that the severity of our climate leaves little scope for the utilization of solar energy in Ottawa. Our latitude of 45° N and the annual average of 1,995 hours of bright sunshine per annum however, place our city in a more favourable position than Vancouver (1600-1800 hrs) or Windsor (1900) which are in lower latitudes.

A number of experiments undertaken by agencies of the Federal Government, by the City and by private enterprise make the feasibility of solar energy utilization quite evident. The Building Research Division of the National Research Council for example, has undertaken the most extensive studies in Canada on the subject, with its MARK XI RESEARCH PROJECT which compares various energy utilization systems in four comparable residential buildings. Another important demonstration project has been promoted by C.M.H.C. through the installation of solar water heating equipment in LeBreton Flats. All indications and comparisons to date show that "active solar" is a viable proposition in this region, in terms of energy utilization.

The City of Ottawa has also been active the use of solar energy. Two demonstration housing units in Overbrook have been fitted with solar heating equipment and the Department of Physical Environment installed solar pre-heating equipment in the Brantwood Park Fieldhouse as early as 1977. Solar de-icing equipment to prevent ice formation below the arena

slab was installed in the Tom Brown Arena in 1978. All these installations have proved to be cost-effective and certainly more economical than equivalent non-solar systems over the expected life of the buildings in which they have been fitted.

The private sector of the building industry in Ottawa has also produced some noteworthy structures for the exploitation of solar energy. The QUARTET passive solar townhouses built by 'ECODOMUS' at the corner of Wilbrod and Chapel Streets, coupled with the more recent active solar townhouses on Charlotte and Wilbrod Streets have demonstrated not only the feasibility of solar heating in Ottawa, but also the increase in net savings as oil and natural gas prices go up.

In order to encourage private and public enterprise to undertake more and wider-ranging experiments in Ottawa until solar energy becomes a widely-accepted alternative to oil, it is important, at this point in time, to consider safeguards to solar access to buildings in our City. Assuming that as a result of the present study, appropriate measures were enacted to protect such access, then householders and companies would invest more readily in solar heating installations, with the confidence that their investment was not likely to be wasted through overshadowing from a new structure in the vicinity of an installation.

ENERGY IN THE HOME

	 Builders	 Buyers	 Sellers
 Is an energy-efficient home worth more?	Yes, 9% more at purchase	Yes	Yes, 7% more at re-sale.
 Insulation—most important new home feature.	82%	95%	89%
 Amount extra buyers would spend for a comprehensive insulation package.	\$828	\$1360	\$934

RESULTS OF A 1978 SURVEY ON ENERGY EFFICIENT HOME VALUES (DOW, 1978)

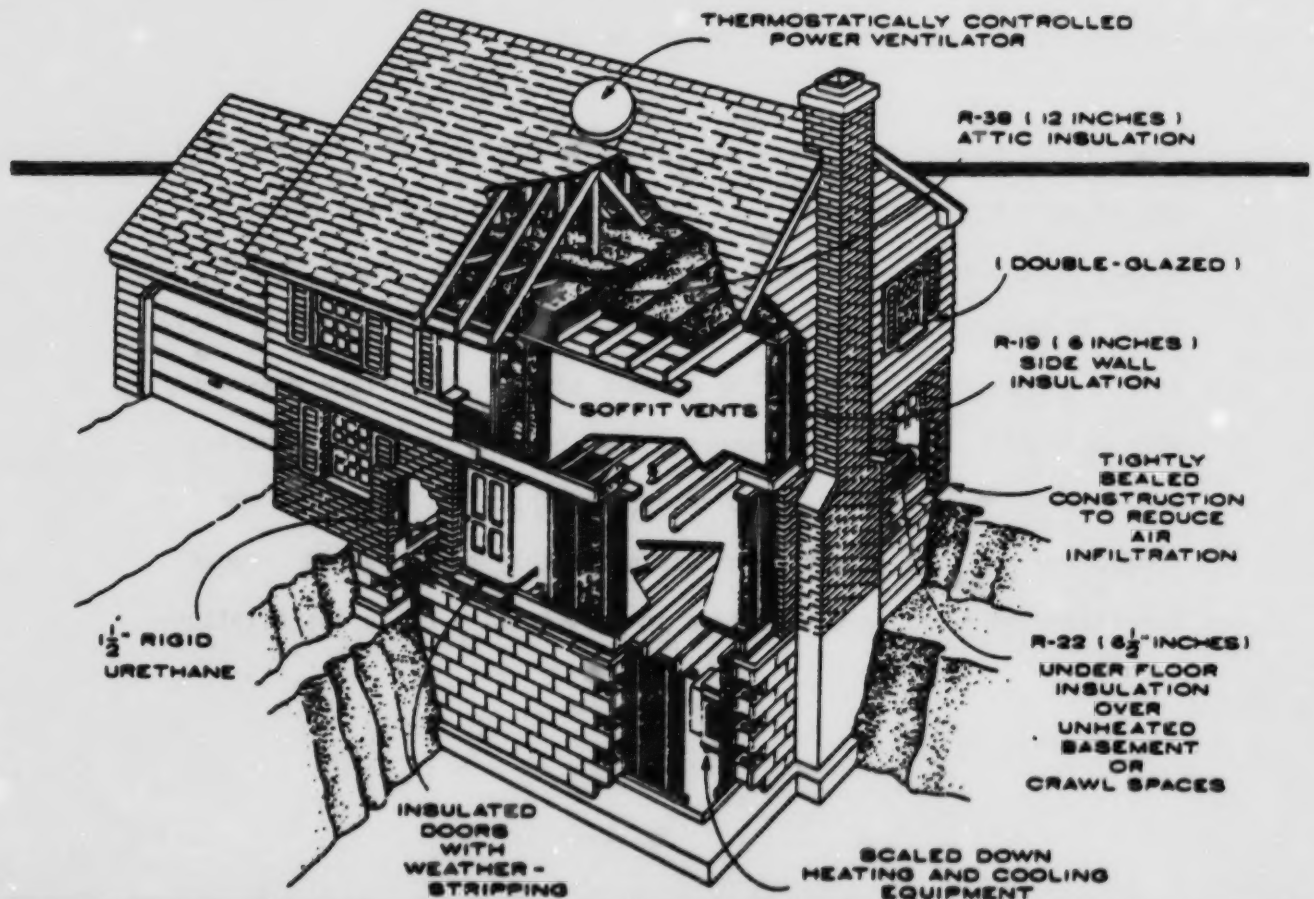


Fig. 2: HOUSE STRUCTURE ASSUMED FOR THE COMPARISON OF HEATING SYSTEMS AND ENERGY - EFFICIENCY MEASURES RECOMMENDED PRIOR TO SOLAR HEATING INSTALLATION

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4.0 Potential contribution of solar energy to domestic heating in Ottawa

In order to illustrate the potential contribution of an active solar system to residential heating in the City, a comparative analysis of oil and solar heating installations and of corresponding annual running costs was carried out under the following assumptions:

- Two-storey, 3 bedroom house, built around 1940 for a single family (Fig. 2)
- Approximately 152 square metres (1500 sq. ft) of usable floor space; 20 sq. m (196 sq. ft.) of window area; 155 sq. m. (1526 sq. ft.) of net wall area (all conversions approximate);
- Mean annual Heating Degree-Days for Ottawa: 4,670;
(Note: Heating Degree-Days (HDD) indicates the difference between 18°C and the mean temperature at a location, multiplied by the number of days during the year in which this difference is observed. HDD is therefore an indication of annual heating demand at a location);
- Total absence of overshadowing by trees or structures in the vicinity of solar collectors;
- Maintenance-free operation of oil and solar heating installation, under 5-year guarantee protection of the consumer.

It is important to emphasize at the outset that retrofitting an older house with higher insulation and thoroughweatherizing measures is an imperative first step to the installation of solar heating systems. Such measures, including storm windows and double glazing could result in savings of 24.36% in the consumption of oil (CMHC, 1977). By comparison, a newly built house, thoroughly insulated during construction rather than retrofitted with these measures, would consume 60.8% less oil than an old house without the benefit of any upgrading in insulation or winterization. Retrofitting an old house is estimated to cost about 10% of the cost of a solar heating system, as shown in the following figures:

TABLE 1: COMPARISON OF OIL AND SOLAR HEATING INSTALLATION AND RUNNING COST

A. INSTALLATION COSTS

<u>Expenditure item</u>	<u>Oil System</u>	<u>Solar System</u>
Heating system	\$ 1,700	\$10,000
Retrofitting insulation, etc.	NIL	1,500
Less CHIP grant		-500
TOTAL (A):	\$ 1,700	\$11,000

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B. 1981 RUNNING COSTS (PER ANNUM)

-Fuel	\$ 2,016.64	NIL
(2062 gallons @ 97.8¢/gal. Feb. 1981 price)		
-Back-up electric heating	NIL	\$17.00
on cloudy days		
(500 KWh; first 250 kw @ 3.68 ¢/KWh)		

TOTAL (B) - (1981)	\$ 2,016.64	\$17.00
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Assuming a 15% increase in the cost of oil and 12% projected increase in the cost of electricity per annum, by 1986 the totals would be as follows:

TOTAL (B) - (1986)	\$13,596.96	\$108.00
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The Grand Total expenditure for these two systems in terms of Installation and Running Costs over the five (5) year period 1981 to 1986 would be as follows:

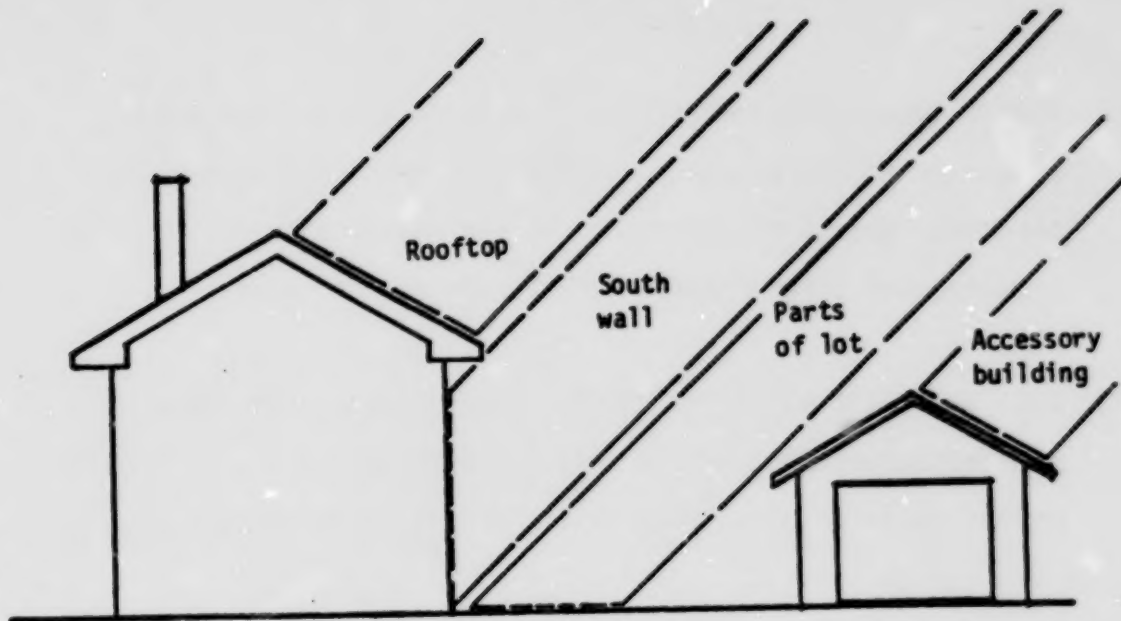
GRAND TOTAL (1981-1986)	\$15,296.96	\$11,108.00
(Difference:	+ \$ 4,188.96	less \$ 4,188.96)

The comparison underlines the importance of the long term view in heating energy audits and proves amply the viability of solar heating. Unfortunately the high mobility of the population in Canada (26% of all Canadians change their residential address every year) makes this long term view difficult to take and the front-end costs of a solar system tend to look rather discouraging. A recent survey of opinion among house builders, buyers and sellers (Fig. 2) indicates that people are prepared to pay between 7% to 9% more for an energy-efficient home.

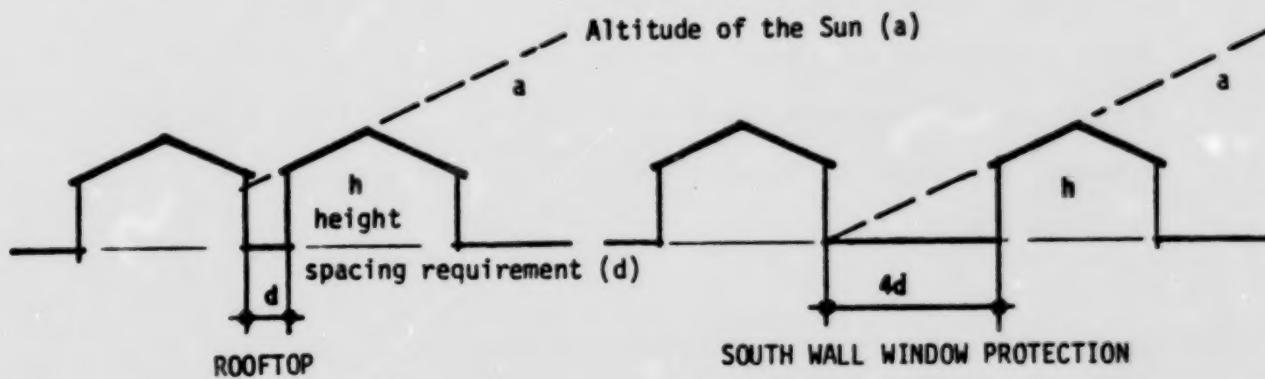
5.0 Options in Solar Access Protection

The most important assumption underlying the foregoing illustration of the viability of solar heating in Ottawa concerned the total absence of overshadowing by trees or structures in the vicinity of solar collectors. This absence ensures complete SOLAR ACCESS PROTECTION which has been defined as "a legally enforceable right to a reasonable proportion of the natural, unobstructed flow of direct solar radiation, to a location where a solar collector could be installed". There are four distinct types or levels of solar access in accordance with the location of an installation, (Fig. 3) as follows:-

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LEVELS OF SOLAR ACCESS PROTECTION



EFFECT OF SOLAR ACCESS PROTECTION ON HOUSING DENSITY

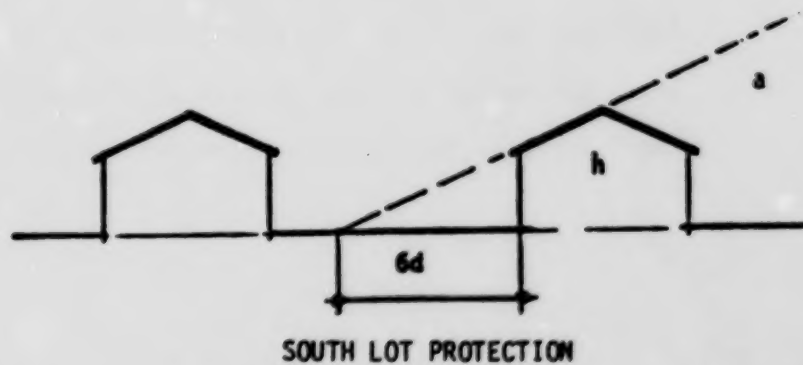


Fig. 3: OPTIONS or LEVELS in SOLAR ACCESS PROTECTION

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- i) ROOFTOP SOLAR ACCESS PROTECTION: This is the simplest and least controversial type of access, because in a residential area of say, two-storey houses, the possibility of conflict between adjacent homes obscuring each other's rooftop solar collectors is minimal.
- ii) SOUTH WALL SOLAR ACCESS PROTECTION: This may necessitate lower residential densities, or specially designed roof and house shapes to protect the solar access space available to a neighbouring house.
- iii) SOLAR ACCESS PROTECTION FOR PARTS OF A LOT allows the installation of solar collectors at ground level. This is obviously a more stringent requirement as the safeguarding of access space all the way to the ground surrounding a neighbour's house, necessitates a large lot, a distant position and perhaps even a special roof or building shape for a house. All these requirements obviously spell more dollars and cents for a house.
- iv) SOLAR ACCESS PROTECTION FOR ACCESSORY BUILDINGS allows the installation of solar collectors on garages and other outbuildings. This may appear to be less important until one considers greenhouses, which may become an important source of fresh food for a household in the future, as food becomes increasingly more expensive.

The type of solar access to be protected may have to vary for each part of the City in accordance with the following factors:

- a. Depth of street blocks;
- b. The number of mature trees on public and private land;
- c. Direction of street - e.g. east to west;
- d. Residential density, as affected by the relative height of adjacent buildings;
- e. The spacing of buildings;
- f. The age and architectural style of buildings producing a geometry of shapes which may facilitate or hinder sunlight penetration;
- g. Local topography - e.g. sudden differences in height of the ground, valleys, hills, etc.
- h. Local community feeling and interest in solar access protection.

Factors (a) to (g) were considered on a preliminary basis prior to working sessions with local technical committees, in order to carry out trial applications of solar access protection for the areas of Glebe, Westboro and Ottawa South (see 6.0 below). The last factor (h) is considered to be the most important one however, and this entire study is meant to help initiate action at community level, in order to ensure that it is fully considered before any action is taken.

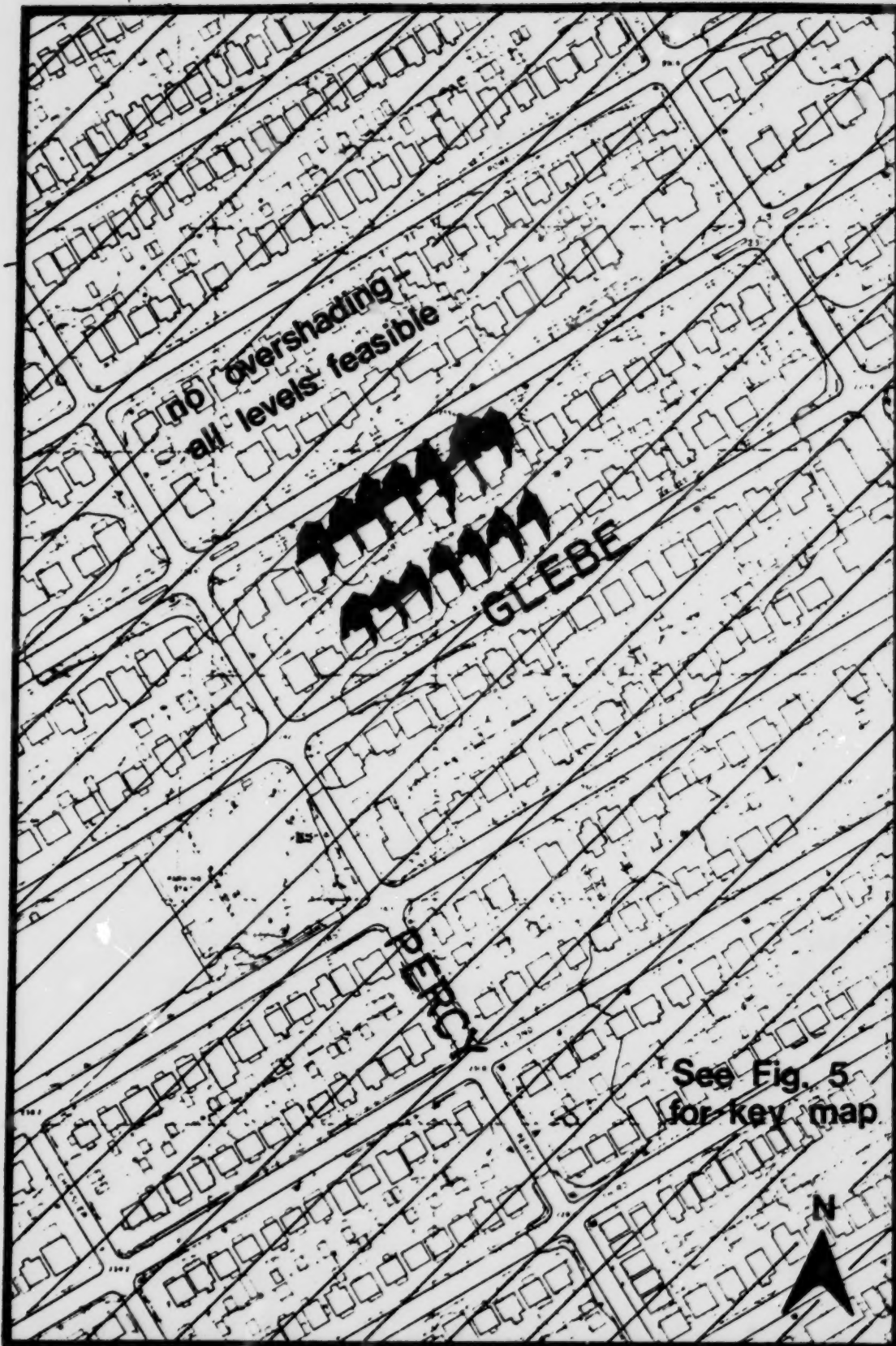


Fig. 4: POSSIBLE SOLAR ACCESS PROTECTION FOR PART OF THE GLEBE.

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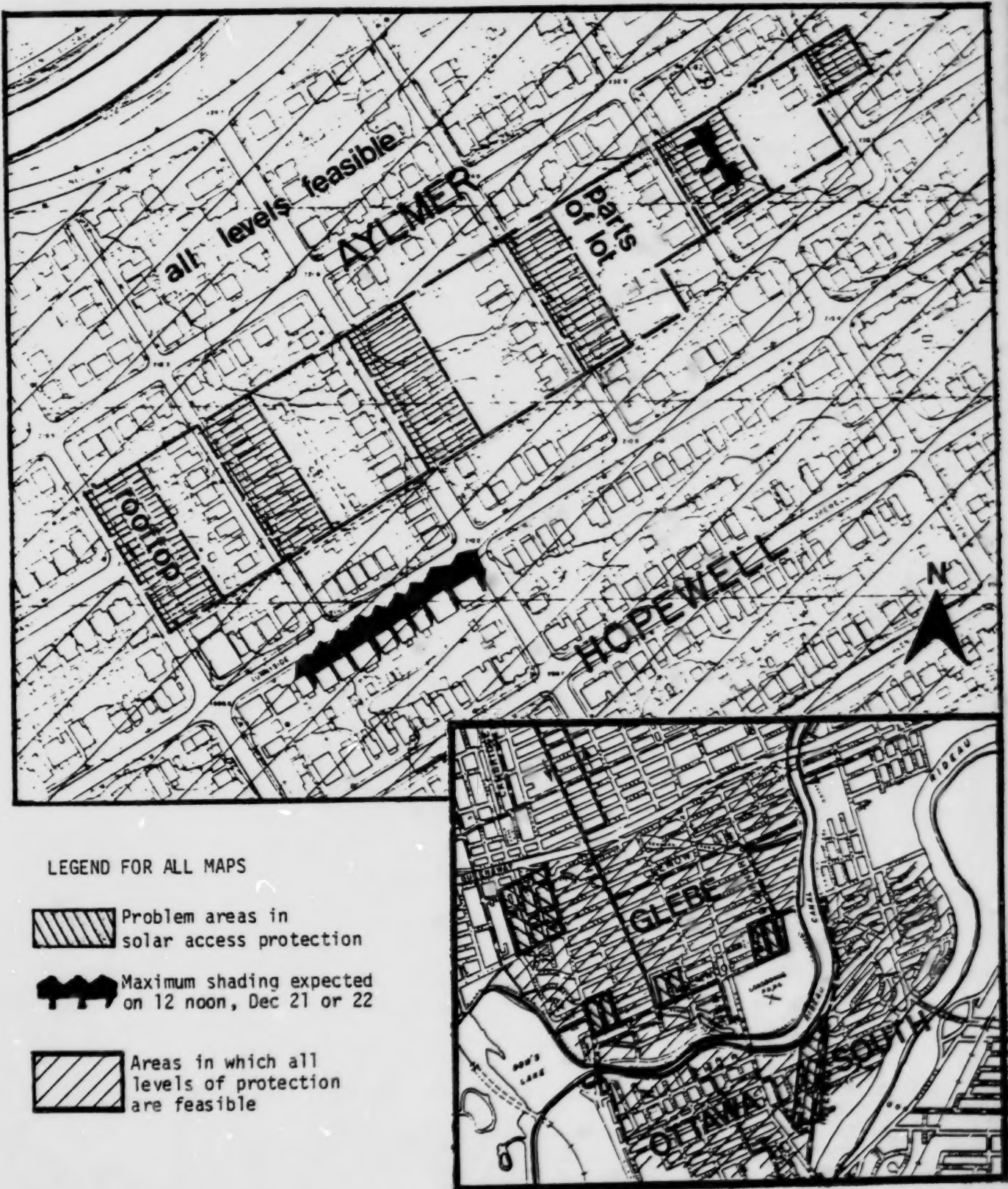


Fig. 5: POSSIBLE SOLAR ACCESS PROTECTION FOR PARTS OF OTTAWA SOUTH.

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6.0 Trial Application

In relation to the three districts forming the immediate focus of this study, it may be said that the depth of most street blocks in the Glebe and Ottawa South, coupled with the direction of residential streets and building spacing, allow all types of Solar Access Protection (Figs. 4 and 5). In certain areas in which lots are smaller and streets run north-to-south, however, the only feasible protection may be Rooftop. Ottawa South presents the least number of problem areas in this respect.

In Westboro the picture is far from clear, because there is a number of 30'x60' sub-standard lots and the predominant direction of streets is northerly (Fig. 6). Experiments with the heliodon of Carleton University's School of Architecture will have to be relied upon to reach some recommendations, should the community itself opt in favour of solar access protection. Part of such protection as regards future development in these and other areas of the city, may be the recommendation to vary side yards to favour the sun-facing façades of buildings, or to stagger buildings (Fig. 7).

7.0 The indirect benefits of solar access protection

The direct benefits of solar access were demonstrated in 4.0, in terms of financial savings to the building owner and the reduced reliance on imported oil for the community at large. There are also some indirect benefits which may be enumerated as follows:

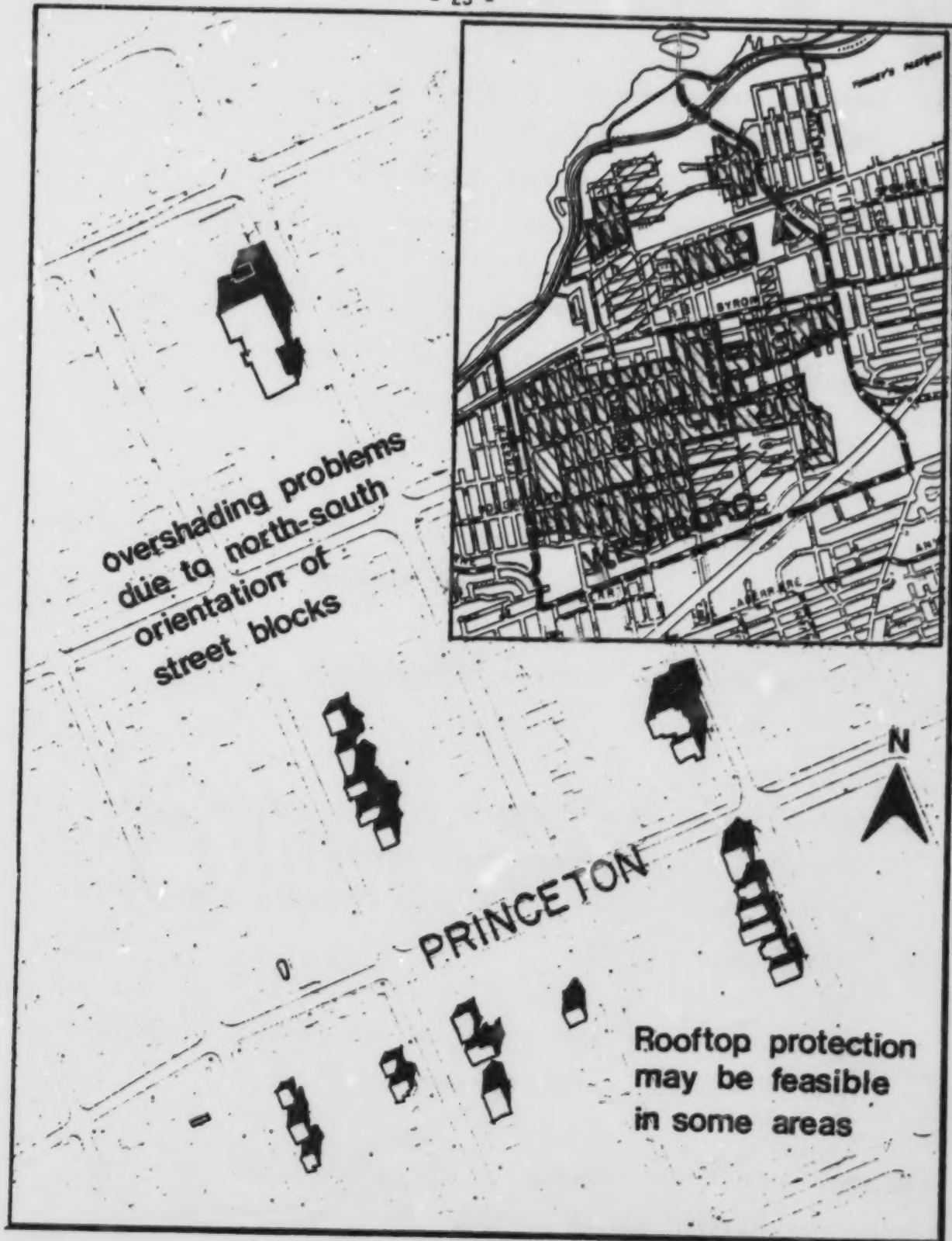


Fig. 6: PARTS OF WESTBORO PRESENTING PROBLEMS IN SOLAR ACCESS PROTECTION.

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1. Energy conservation over the long term, by virtue of the fact that solar access protection could affect:
 - i. The spacing, height and shape of buildings - hence the intensity of land use in an area, which is highly relevant to energy consumption;
 - ii. The choice of residential building types, by virtue of the fact that it favours multi-family dwellings, townhouses, row houses and juxtaposed dwelling types in general. By contrast, single housing units which have to be spaced widely apart to protect solar access, will tend to become increasingly more expensive, because they shall require larger lots. The choice of building type affects crucially the energy consumption for heating, as illustrated in Fig. 8.
 - iii. Speed and ease of transportation by virtue of the effect on building density.
2. Employment growth and diversification by virtue of the encouragement it provides for a growing technology. Ottawa is particularly suited for solar technology industries in view of the existing labour pool in research and high technology.
3. Stimulus to architects and designers towards a creative, science-based style of architecture and building technology;
4. More variety in the urban scene by virtue of new shapes, innovative styles and novel materials coming into use to meet our needs;

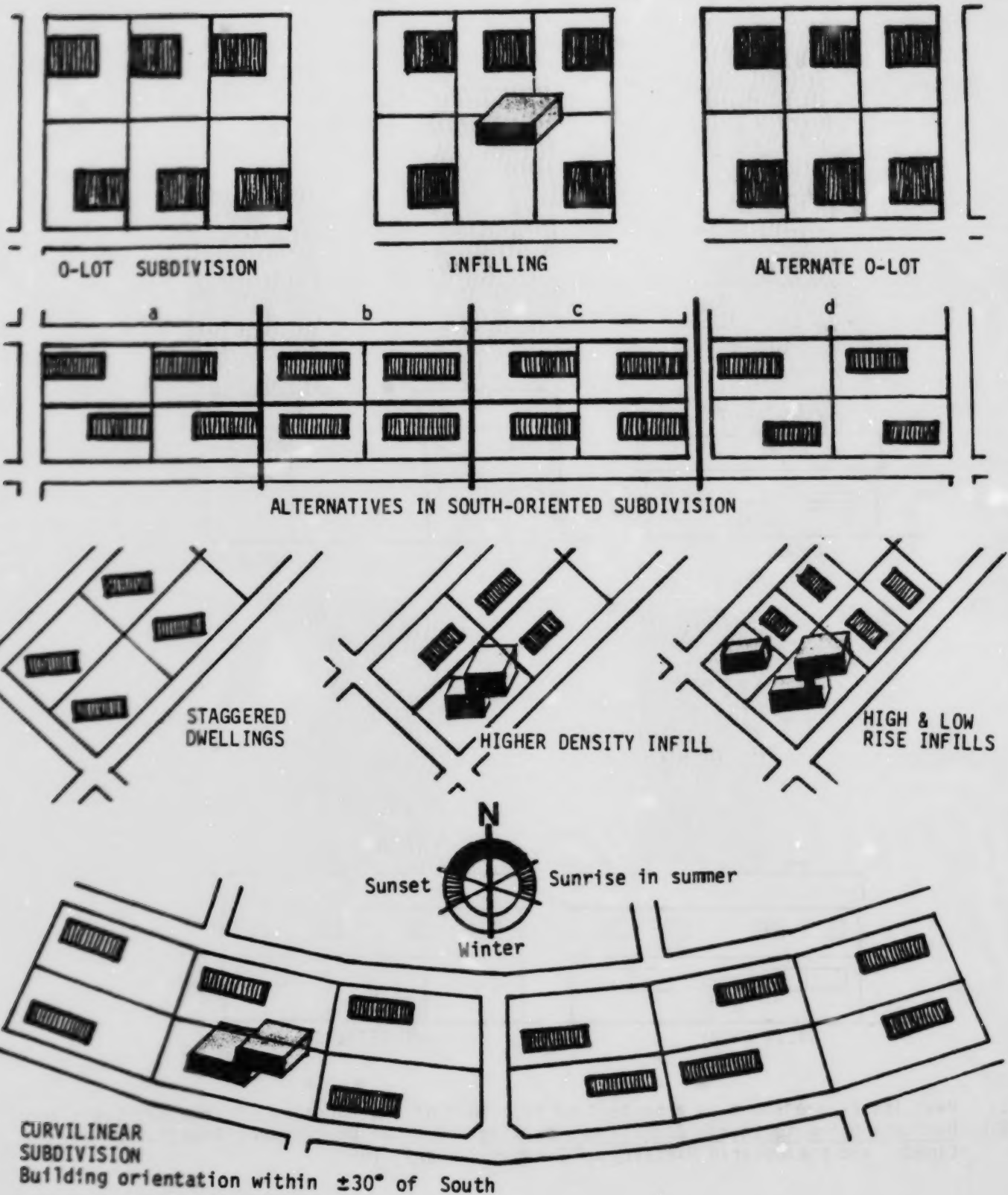
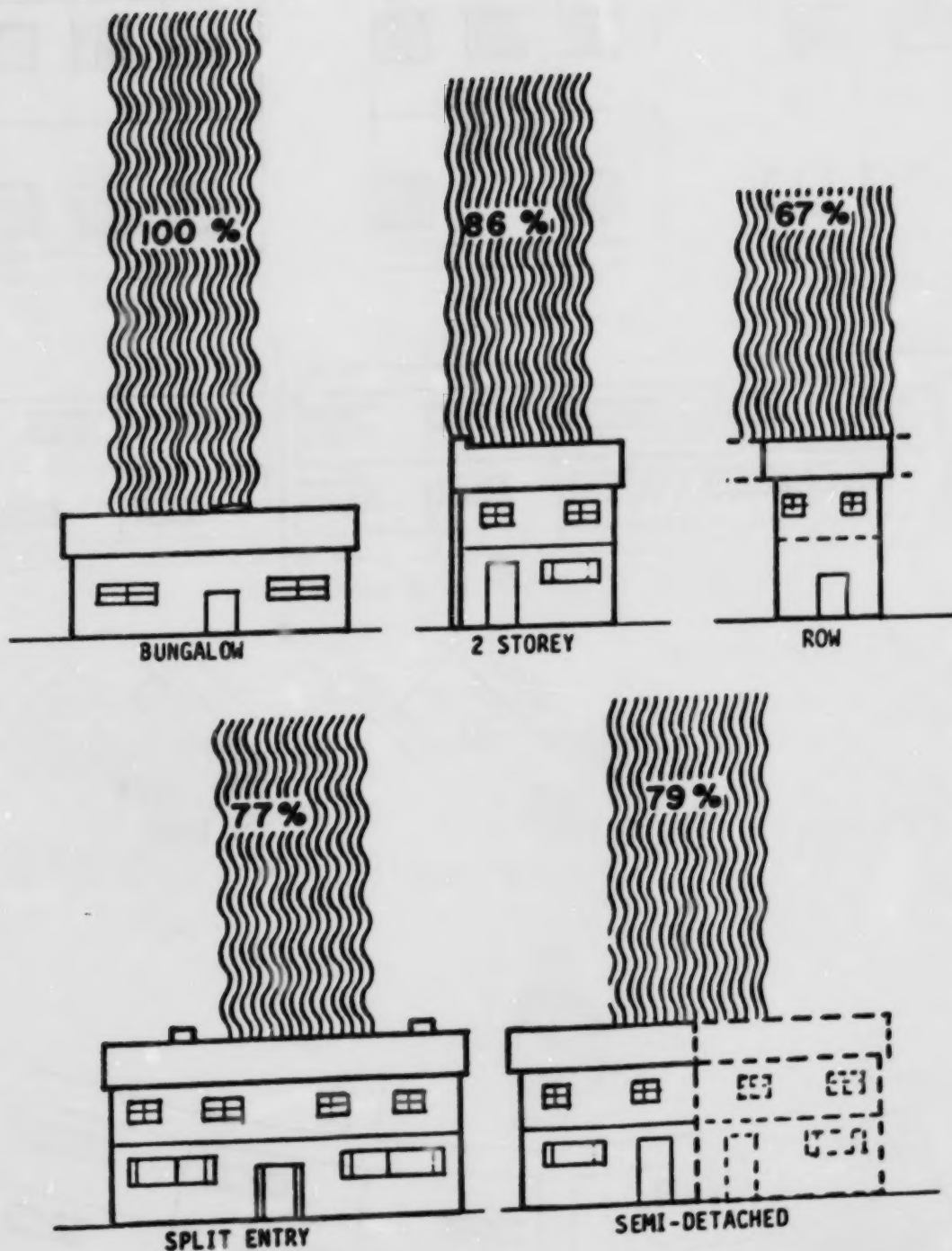


Fig. 7: LAYOUTS FAVOURING SOLAR ACCESS IN NEW HOUSING DEVELOPMENT.

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NOTE: Heat losses are shown as a percent of heat loss of the bungalow of same habitable area.
SOURCE: Builders Guide to Energy Efficiency, Housing and Urban Development Association of Canada, and the Ontario Ministry of Energy, January, 1980.

000314

Fig. 8: RELATIVE HEAT LOSS BY DWELLING TYPE

5. Sense of fair play in the distribution of opportunities to avail oneself of a ubiquitous source of energy, on the basis of land ownership.

Some of these may be debatable as benefits and there are certainly some counter-arguments to be made in Part E of this study. Suffice it to say that the purpose here is to stimulate public debate on the issue, rather than arrive at definitive conclusions one way or the other.

8.0 Legal implementation of solar access protection

Existing law in Ontario does not protect solar access and agreements between neighbours in writing to respect each other's solar access space could be legally complex and expensive. A Ministry of Energy publication titled PERSPECTIVES ON ACCESS TO SUNLIGHT (1980) explored all potential legal mechanisms - private agreement, doctrine of ancient lights, restrictive covenant, purchase of solar corridor air space, etc - and concluded that SOLAR ACCESS ZONING could become the least cumbersome and principal long-term instrument for such protection. Under this novel type of zoning, municipalities would define the extent of areas in which various sets of restrictions would be imposed on building development, signs and planting in order to encourage property owners in these areas to utilize solar energy, through passive or active solar systems for residential, industrial or commercial purposes - i.e. to become solar users.

The simplest way of incorporating solar access zoning in the Official Plan of a municipality would be through the inclusion of general statements to overlay existing zones with requirements affecting building height, bulk, location, setbacks, landscaping, lot dimensions, density and in some cases, land use. Site Plan Control could easily enforce all these requirements, once they had been stipulated in a zoning By-law and a building permit. The advantage of this method is that existing zoning and property values are accepted and only small portions of appropriate zones may have to be given an additional solar classification. The assumption throughout such an Official Plan Amendment is that different degrees of encouragement may be provided to solar users in various areas, in accordance with relevant factors, as for example, existing vegetation, architectural heritage, local traditions and community feeling. Thus, the advantages of 'SOLAR ACCESS ZONING' through an Official Plan Amendment may be summarized as follows:

1. Simple and timely: Builders and potential solar users are given assurance of their 'right to light' to facilitate their decision to 'go solar'. This assurance may also facilitate finance borrowing from banks, CMHC and other institutions.
2. Clear, comprehensible and easy to administer because zoning is widely understood and respected.

3. Promotes understanding between neighbours about respective rights-common to all in a neighbourhood - making it possible to ascertain impacts in order to plan the location and area coverage of solar collectors.
4. Easy to terminate. Following an experimental period, solar access zoning could be rescinded without permanently freezing land use.
5. Flexible in accommodating itself to local circumstances and to technological change. Novel types of solar collectors for example may have different access requirements. It can also accommodate itself to new as well as retrofit installations of solar equipment, high as well as low building density areas, etc.
6. Fair in imposing restrictions and responsibilities to all property owners in an area, for their own benefit, should they wish to take the opportunity.
7. Equitable in distributing the costs and benefits of solar access to all property tax-payers without impairing private or municipal budgets and without necessitating compensation for restrictions which, in these times and circumstances, appear to be reasonable.

These advantages should not conceal the fact that Solar Access Zoning - like any other type of regulation - imposes new responsibilities as well as creating new opportunities for the citizen. After a period of trial application in selected areas, the Council should reserve the right to modify this zoning in the light of comments received from the public.

E. THE CASE AGAINST SOLAR ACCESS PROTECTION

1.0 Scope

The case against protecting access of the sun to buildings and preserving the status quo as regards zoning on this matter, consists of social, political, economic, environmental and legal arguments. Citizens and elected representatives should consider and extend these arguments in terms of possible impact on their own circumstances, before reaching a decision on this controversial matter.

2.0 Social objections

The direction of solar access in relation to a group of buildings in an area, tends to favour those placed south, south east or south west (in the northern hemisphere). It is the north-located buildings in an area which should therefore have solar access protection by being allowed to rise higher. Blanket zoning may not be the answer and if imposed at this premature stage it will simply give rise to disputes and spoil relations between good neighbours.

3.0 Political objections

It may also be argued that as the distribution of land at present is far from equitable, the protection of solar access will only serve to compound

and perpetuate existing inequities. Square or near-square lots will have a smaller periphery with solar access protection than rectangular and linear lots - e.g. riverside walks. Should private and public properties have equal solar access protection? Could this "protection" be exploited by an extreme left or right wing regime, or financially pressed tier of government to extract more taxes from property owners?

4.0 Economic objections

The protection of solar access will tend to seriously curtail the space available for extensions in the courtilage and particularly above existing buildings. This will mean a drastic reduction of development in existing built-up areas, with dire consequences to the building industry and corresponding prospects of employment. Unwittingly, we shall have reduced the potential for higher density in the very areas which energy conservation and existing infrastructure would indicate as being most desirable. The stimulation of solar technology by solar access protection may turn out to be a 'pie in the sky', because it will be new buildings rather than retrofits that will truly enhance the prospects for the production of solar technology products. A well-conceived new solar home for example, may accommodate up to 1500 square feet of collectors while a retrofit on an existing home could take little more than 300 square feet.

5.0 Environmental objections

The most deplorable effects of solar access protection are likely to be seen in our physical environment, because it will not be only the buildings but also the trees that will be affected for the sake of solar collectors.

Buildings of traditional and time-honoured styles for example, will be retrofitted with shapes and materials of a rather incongruent technology, requiring extensive flat and shiny surfaces, which may or may not produce an acceptable contrast let alone a harmonious whole with existing architecture. It would not be too far-fetched to claim also that the extensive glass surfaces will be most vulnerable to vandalism and the expense of replacing a solar collector being high, people will have to bear with the vandalized appearance of these contraptions for some time. Once more, only in a well-conceived new house could this problem be properly overcome through design and reliance on height, shape and distance.

As regards the treatment of existing trees in a built-up area enjoying the benefits of solar access protection, suffice it to quote here the by-law passed by an American city in this respect:

"A non-conforming portion of a tree, which casts a shadow on a solar collector in violation of the regulations (on solar access protection), may remain and be allowed to grow for as long as a living portion of the tree continues to shade the collector on each December 21, if it is found that according to the best available evidence, the tree cast a shadow on the solar collector site on December 21 of the year in which the collector was installed in the subject location."

This 'merciful' approach to trees is not likely to be extended to newly planted vegetation. Extreme measures like these, could seriously alter the urban scene in Ottawa's existing areas - particularly the Glebe - where a balance between the natural and built-up elements has been established after long decades of perseverance in planting and re-planting.

6.0 Legal counter-arguments

The quoted sample of solar access protection ordinance demonstrates the probable complexity of zoning regulations for such protection. There is irrefutable evidence that restrictions imposed by law, however well-intended at the time of conception, have inevitably given rise to litigation and bitterness. As regards development control, there is much to be said for reducing the complexity of present regulations and streamlining current approval procedures to speed up the development process. The slow pace of development is seriously affecting economic growth and it is surely a paradox that approval procedures take longer and longer, while technology is providing the tools to speed up building operations.

The difficulty of integrating solar collectors with traditional building shapes is likely to give rise to many disputes between designers and development control officers. Even if they agree, local review boards on architectural or planning control may be less prepared to accept the more extreme samples of this hybrid architecture of retrofit solar on traditional. The approval procedure is therefore bound to take longer, be more litigious and more frustrating for all parties concerned.

In view of the arguments presented in the case against solar access protection, the safest way to apply solar access zoning would be in areas of new housing, new building and new development in general. After an experimental period of application, it could be extended to more controversial areas of traditional building and long-established communities as for example, the Glebe, Ottawa South and Westboro.

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E. CONCLUSION

The benefits of solar energy and the arguments in favour of protecting access to allow the largest possible number of households to avail themselves of this energy are no doubt powerful. On the other hand, if the Council considers the various impacts of solar access protection and judges them to be too high a price to pay for the added privilege of protection at the present stage of the city's development, then the citizens of Ottawa will at least have the satisfaction that the matter of solar access protection has been fully considered, but for the time being dismissed as a pressing need. In either case, this report will have served a purpose.

GA:cse-5

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From pioneer settlement...

To stately suburb



A heritage guide to Westboro

Westboro—160 years of settlement

The Westboro area began as a collection of family farms in the first half of the nineteenth century, blossomed with the rise of the Ottawa Valley lumber industry, matured with the early twentieth century real estate boom and reached its present status as a tree-lined suburb of Ottawa after the Second World War.

Settlement of the area dates back to 1817 when Scottish emigrant William Thomson began the first farm. He started building Maple Lawn, his family home, in 1831 and today it is the oldest surviving house in the area.

In the following few years, soldier-settlers constructed a road connecting a landing near Parliament Hill with the military settlement of Richmond. The road, soon called the Richmond Road, was the first in the county and one of the earliest in Upper Canada. Such a convenient thoroughfare made this area a popular choice for prospective landowners.

Two of these early settlers were Thomas and Robert Birch, who purchased land east of the street that became Churchill Avenue. This section was called Birchtown and the land to the west, Baytown.

It was not until 1852, however, that the area really began to attract residents in greater numbers. In that year, James Sked built what was then one of the largest steam sawmills in Canada. As a tribute to this man, the older names were dropped in favor of Sked's Mills. Over the years, as a result of the

economic stimulus of the lumber industry, the area changed from being a pioneer settlement into a respectable suburban village.

Tragically, Sked's mill and another he built in 1871 were both destroyed by fire; the first, under apparently suspicious circumstances on a Halloween and the second, a few years later.

By the 1890s, the name of Sked's Mills for this flourishing community wasn't considered good enough by many of its newer inhabitants, who began calling it Ottawa's Westmount. The dispute over the name came to a head at the end of the decade, when residents voted for a new name. Westboro was chosen from among such names as Springbrae, Birchton, Rockmount, Earlwood and irreverent suggestions such as Hypocrite Hollow and Piety Hill.

In 1901, John E. Cole applied to the Nepean Township for permission to subdivide his land. His plan was to offer real estate at prices that would attract new residents to the Westboro area. He called his subdivision Highland Park after the original Highland Farm owned by his father, Thomas H. Cole.

Four years later, with its population around 200, Westboro was incorporated as a police village in the Township of Nepean. In 1950 it was amalgamated into the City of Ottawa.

During the late 1950s and early 1960s, the National Capital Commission bought lands alongside the river to make way for the Ottawa River Parkway.



Maple Lawn at the turn of the century.

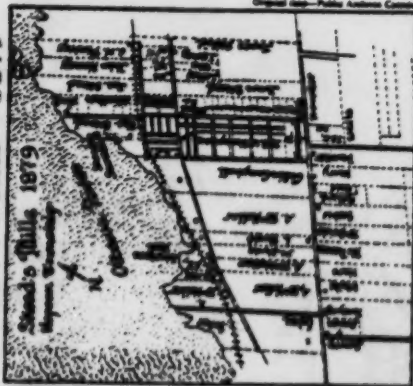


Senator James Sked in April 1875.

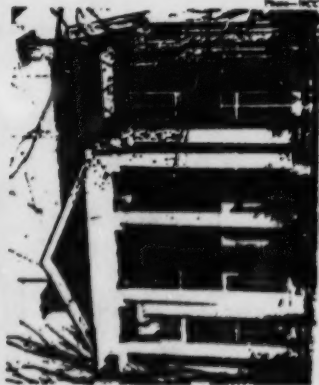
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APPENDIX 2

Skead's Mills — 1879

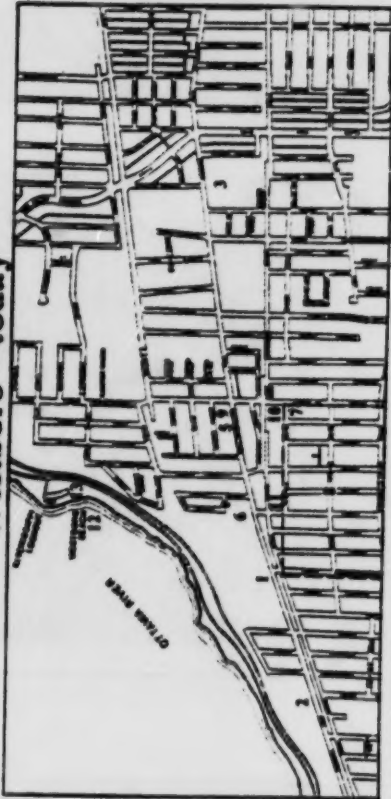


Deep cherting family home and higher density housing near the bridge in the late 1870s.



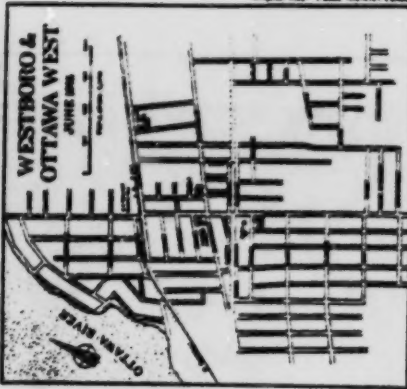
The McKellar home with the pillars added by the Bingham family.

Westboro—today

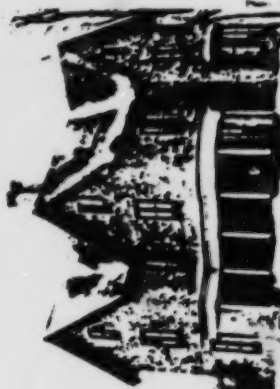


1. This heritage home, known as Maple Lawn, was built by William Thomson between 1831 and 1834. Thomson H. Cole bought the property in 1878 and it has remained a family residence ever since. In 1936, Cole's grandson, Lloyd Rochester, bought Maple Lawn. It is now owned by the NCC and was tenanted by Mr. Rochester until his recent death.
2. New often called the McKellar Home, this house was constructed around 1835 by William and John Thomson, sons of the pioneer William Thomson. Archibald McKellar bought it several years later and in turn sold it to John Bingham around 1910. During Bingham's ownership, the original structure was enlarged to include the present front and rear sections. In 1954, the old house was sold to the radio station CKOV and is now being renovated as apartments.
3. Linden House and The Elms were two of the names of this spectacular home. The land was first bought by George Lyon in 1819 and at one point was the property of Rev. Skead. Senator James Skead's wife, she sold the house to Alton Holland in 1887 and in 1910 it became the property of the Sisters of Visitation, remaining so to this day.
4. This was the site of Senator Skead's two steam sawmills. By the late 1870s, both had been destroyed by fire and all that remains today are scattered ruins.
5. All Saints Anglican Church, Westboro, was built in 1865. Today the original building serves as a chapel.
6. This wooden structure, now known as the Ketchum House, was probably built in the 1870s.
7. The first Presbyterian Church in Westboro was built around 1875. The new (United) church (7) was completed in 1913 and was constructed of brick.
8. The Thomson farm was bought in 1878 by Thomas Cole, who named it Highland Dairy Farm. Shortly after the turn of the century, the Cole family subdivided and sold this area (8) as residential property. The result was the Highland Park community.
9. The Nepean Town Hall was built here in 1896. When the Westboro area was annexed by Ottawa in 1950, Nepean Township built a new town hall in Nepean. Corners and took the old fire bell from the tower. It is now the symbol of the City of Nepean.
10. Westboro Public School was founded in 1910 and is now called Churchill Avenue School. It occupies the highest point of the area.
11. The Highland Park Lawn Tennis and Bowling Club began here in 1914 and is still in the same location today.
12. In the early years of this century, the shade-covered Westboro Beach was considered a safe and pleasant location for swimming and playing. It was popular, but was virtually ignored by people of Ottawa in favor of Britannia Beach to the west. Westboro Beach's sand was added later.
13. This was the site of the Frickadero Dance Hall, a lively place of entertainment in the 1920s and 1930s.

Westboro—1915



By 1915, the street layout was largely as it is today, although many names have changed.



The Elms, now the home of the Sisters of Visitation.

Trees in Westboro

The Current Discussion Paper CD-164-6 entitled "Planning Measures to Safeguard Access for Buildings in Ottawa" considers trees only as a general term. Our Local Advisory Committee in Westboro believes the subject 'trees' must be considered in greater detail under the sub-headings of -

Coniferous trees
Valuable Deciduous trees
Trash or nuisance Deciduous Trees.

Coniferous Trees

By retaining their needles throughout the entire year, coniferous trees drastically restrict solar access during all seasons. Therefore the local individual coniferous tree species - pine, cedar, balsam, spruce, etc. - must be eliminated where they restrict solar access, the only consideration of their retention being where they are used as windbreaks or hedges.

Deciduous Trees

Deciduous trees by shedding their leaves each fall, drastically restrict solar access during the summer months only. However, deciduous trees may be further sub-divided into the twin categories of -

- a) Valuable Deciduous Trees
- b) Trash Deciduous Trees

Valuable Deciduous Trees

The Valuable Deciduous Trees common locally are -

Sugar, red and other hard maples
Locust
Oak
Chesnut
Fruit Trees - apple, plum, cherry, pear, etc.
Mountain Ash
Hickory
Beech
Walnut
London Plane or Linden

Where reducing solar access, these beautiful shade trees should only be removed after careful consideration in each individual case.

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Trash or nuisance Deciduous Trees

Trash or weed deciduous trees common locally are -

Poplars, all types
White Ash
Elm
Soft Maple

When reducing solar access, these trash deciduous trees should be removed ruthlessly.

Gardens

Current Discussion Paper CD-164-6 refers mainly to "solar collectors". Our Local Westboro Advisory Group believes the phrase should be expanded to read "solar collectors and gardens". Gardens are themselves solar collectors in that the individual plants use sunlight directly.

Fences

The current Discussion Paper CD-164-6 does not cover "fences". Our Westboro Local Advisory Committee recommends a new clause be added under the heading of "Fences":

"no fence shall restrict more than 25%
of the sunlight".

D. Smiley.

NOTE ON A LEGAL TERM:

Building vs Property

Discussion Paper CD-164-6 should read - "Property" rather than "Buildings". There is also the doubt that many of the older existing buildings do not have the structural stability to be safely loaded with solar panels, either on a roof or a wall. This means erecting solar panels elsewhere than directly on buildings.

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IDEAS ON SOLAR ACCESS PROTECTION

As contributed by householders in Westboro, Ottawa, in the course of a public awareness campaign on solar access, in May and June 1982.

BACKGROUND

In accordance with the program of work for the ECTP research project SOLAR ACCESS PROTECTION IN BUILT-UP AREAS, as approved by the Ontario Ministries of Energy and of Municipal Affairs and Housing, the City of Ottawa derived the main principles for a Solar Access Protection By-law through public participation. The process is summarized in Appendix 1, p. 2 and the step following derivation of principles was a public awareness campaign outlined on Appendix 2. The major tasks in this campaign were distributed (Appendix 3) to all members of the Westboro Solar Access Committee of residents - the Westboro Solarians, as they came to be known - on the basis of networking to ensure maximum sense of involvement. Appendices 4 and 5 show examples of the type of publicity generated on the subject, at the scale of the local community and the City.

THE OPINION SURVEYS

Following this publicity, a two-stage Public Opinion Survey was launched on the basis of the questionnaires shown on Appendices 6 and 7. Both of these incorporated open-ended questions and appropriate space for the contribution of ideas by the respondent. The following summary of these ideas is based on a classification into positive (constructive) and negative and involves no editing in order to ensure that the essential message is not adulterated.

A. CONSTRUCTIVE IDEAS

"I cannot indicate just how strongly I am in favour of the proposed legislation. It is very refreshing to see a municipality which looks towards the future, even if other levels of government are trapped in the past. Although I realize that the "fiscal crisis" must be considered, it would be nice if property tax benefits could be given to those who "go solar."

"Zoning by-laws might be a good idea. Areas could be assigned to highrise development while other areas were assigned to 2- or 3-storey buildings."

"The right to sunlight is, of course, very important. Each owner of land and/or of a building should have the possibility to obtain the adequate information and, if possible, the help."

"On the other hand, the owner of land and/or building should have the right to decide by himself which part of vegetation (or all of it) to keep, whether it is not interfering with sunlight or otherwise. The decision should be his. Any compulsion would interfere with his freedom."

"I am in favour of all kinds of surveys and of advice given to land or house owner."

"I am against any compulsory changes of vegetation or buildings and necessity to obtain permission for new vegetation to be added - unless it is clearly and definitely harmful to neighbours."

"I am against permits to be required as mentioned in provision (d) on page 3, bottom."

"New subdivisions would be layed out with a north-south orientation rather than east-west."

"I believe that the proposal does not adequately protect the neighbours of the person installing the solar collector. These neighbours may find that the options for developing their own properties have been severely curtailed by his action. It would appear from the proposal that they would have no recourse against, or indeed notice of, such an action.

"I would suggest that the process for obtaining an installation permit include notification of affected neighbours, together with diagrams indicating the development restrictions which would be placed on them by the proposed installation and some analysis of other possible installations which might have a lesser impact on them. Neighbours could object to the proposed installation at a public hearing which would have the power to modify or deny unsuitable proposals."

"With respect to the protected surfaces, I would suggest that limitations be placed on the use of the south wall and the south-side lot where these face the side or rear lot lines. Without such limitations, neighbours could be faced with greatly increased building set-backs from the lot lines in order to avoid shading the solar collector."

"Further to the question of protected surfaces, I am uneasy with the phrase "or any other feasible location selected by the owner". The owner should be required to demonstrate more than simple "feasibility", or neighbours could find themselves suffering unnecessary restrictions in order to protect a poorly located collector, or collectors, located for the purpose of "staking out" territory."

"Limitations should also be placed on protected surfaces in the case of bungalows, otherwise the owner's neighbours might be forced to construct bungalows too in order to avoid shading the collector."

"I am very much concerned by the possibility that a non-conforming structure could not be rebuilt, if destroyed, because of the proposed by-law. Owning a two-storey house on a narrow lot, particularly if flanked by bungalows, could prove to be a very risky proposition."

"A by-law such as this one, which permits an owner to impose developmental restrictions on his neighbours, must contain protections for those neighbours. "Protected surfaces" need to be defined more carefully and the application review process broadened to address not only structural stability but also impact on neighbouring properties."

"As cited in Bill 248, The Right to Sunlight Act passed in 1982 in the legislative assembly of Alberta, offences in the refusal to adhere to the above-mentioned provisions must be punishable by summary conviction which are well-defined to the public."

"The assumption here is that this protection is for houses only. What about protection of land, i.e. existing well-established vegetable gardens? In the future mobile solar collector panels are also a possibility. Would solar protection be applicable to detached buildings or structures such as garages with greenhouse, detached greenhouse, even solar heated swimming pools, etc.? I am presently being shaded by new infill housing which has a great affect on my vegetable garden. Solar proection for food production is just as important as the solar energy problem!"

"Mature trees and hedges add considerably to the pleasant environment of Westboro. We are concerned that residents might be given the legal right to have their neighbours' mature trees and hedges removed or cut if they impede solar access. We do favour limitations on the height of buildings."

"I regret I am unable to fill this in. I have insufficient information and have given it too little thought to answer knowledgeably. I only know that I believe in a variety of forms of heating - solar very definitely being one - and I would like to see this done in the wisest way, at the same time not infringing on other peoples' "sunlight" or "territorial rights."

"Administration cost MUST be kept minimum. Enforcement should not create additional tax requirements."

"When a permit is requested as per provision (d) that copies be distributed to neighbours for concurrence or objection as in Building permits."

"Before ANY by-law is enforced on any property owner, he or she should have the option to express their opinions and taken into consideration."

"I would not want the emphasis on the planting of evergreen rather than deciduous trees to be exaggerated."

"That construction take place in certain developed areas to receive free benefits from the sun (or that suggestion to construct solar housing take place in a region separate to the industrial and highrise residential areas of Ottawa)."

B. NEGATIVE COMMENTS AND IDEAS

"No mention is made of the size of the collector for which a permit is required or do you intend that even a small device be regulated? In my opinion this is the kind of red tape that would prevent anyone from attempting to use solar energy. More clarity of this item is required."

"It should not be necessary to obtain a permit for a solar collector if the builder doesn't want the protection of the by-law. I would be concerned about the growth of a massive city bureaucracy to support this by-law."

"I am against any more controls as to how I use my lot. I am a considerate person. I will consider my neighbours in all construction matters (common sense). I would fight your organization if the necessity arose."

"The principle of 'right of light' is satisfactorily covered by the tradition of 'English Common Law'. If the object is to advocate the use of solar energy, this is a non-economic allocation of resources, which shouldn't be encouraged by City regulation. The resulting limitation to urban growth could result in energy being lost than any solar devices will save in Ottawa, etc."

"How knowledgeable are the members of your committee? Are they experts or recognized as such, or merely people with self-reserving opinions? The value of such a committee depends only on whether its expertise is acceptable! Enthusiastic, but non-informed pressure groups are apt to go off on dangerous or unacceptable targets! You should not be self-assessed, but assessed by recognized authorities! Has your committee a battery of advisors, architects and engineers who can provide objective opinions on these problems?"

"As far as I'm concerned, any 'solar collector' is a hideous looking addition. I would rather see green shrubbery and trees. How about the ecology in the area? There are too many trucks allowed to park in 'residential' areas. The noise and fumes at all hours of the day and night are detrimental to one's health as well as an eyesore to the community. I am not interested in highrise buildings in areas of smaller type homes. I like the 'right to summer time shade'!"

"Stop the bureaucratic 'crap'. I am tired of the continual invasion of property ownership. What I do on my property is MY business, as long as I maintain or increase the value of my property. If you wish to stop shade, then zone accordingly. (or cut down all the trees)"

"I feel that a number of "do-gooders", who are probably newcomers to the village are interfering, and thereby opening another opportunity for City Hall to organize another department (more red tape) which will have to be staffed - therefore more costs - higher taxes and permits."

"No wonder our taxes are so high when public servants (municipal) are paid to produce rubbish like this. I would suggest a 50% cut in salaries of our local and regional politicians."

"The proposed requirements are far too restrictive. As an expert in the field of energy conservation policy and program development, I question the need for such restrictive provisions. On north-south streets the proposed regulations would prohibit almost any alterations to existing buildings and would prohibit their replacement in the event of destruction by fire, etc. Solar access is motherhood. The implications are another thing. I fear this survey downplays the risks."

CONCLUSION

Appendix 8 summarizes the result of the Opinion Surveys and Appendix 9 shows an article to the same effect, as it appeared the day following the public meeting in Westboro, in the Ottawa Citizen (July 9, 1982). Finally, Appendix 10 shows a preliminary draft of the Solar Access Protection By-law formulated in the light of research by the Westboro Solarians and the outcome of the Opinion Surveys, as synthesized by the Energy Planning Section of the Community Development Department. This preliminary draft is currently being circulated to experts in Canada and abroad for comment. Enactment by the new City Council is expected in December 1982.

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B I B L I O G R A P H Y



B I B L I O G R A P H Y

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shutters, trombe walls and sun
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expectations. Solar gains in
winter also below expectations.
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Methods examined: Windows, phase-
change materials, domestic hot
water heat pump. Performance
tested with ENERPASS computer
program. Results: Opt. south
facing window: 5% of area above
grade or more with higher thermal
mass. Best change-of-phase
temperature = 6°C. Priority: -
Develop low heat loss windows.
Windows and heat pump could reduce
energy need considerably.

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communities.

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in SUNFEST '83 Conference
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plant world by reference to energy
or heat units absorbed in a given
location. Comparison of blooming
period of plants in a greenhouse
leads to conclusions about heat
absorption and energy efficiency of
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A comprehensive design guide towards reduced space heating needs - the first of 16 parts on energy-efficient subdivision design. (E-ESD) Housing consumes 20% of Ontario's total energy - 70% of that (i.e., 14% of the total) going for heating. E-ESD could save up to 20% of the heating energy - i.e., 2.8% of Ontario's total.

All design techniques related to E-ESD must be applied consistently and jointly, because individually they do not necessarily lead to savings.

Conservation is only one of the range of opportunities and constraints in subdivision planning and it should be considered as such, rather than an overwhelming priority.

Solar information (angles, azimuths etc.) is often called from foreign publications and is not wholly applicable to Ontario.

E-ESD principles:-

1. Match dwelling types to appropriate orientation.
2. Wider lots on the north side of east-west running roads (why not on south side too?).

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MacMillan and Company, New York.

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3. Aim to gain solar radiation as well as reducing heat loss due to prevailing winter winds (N.W.).
4. Large windows and max. glass area on south.
5. Bathrooms could face north. All other rooms need sun at some time of the day.
6. A dwelling facing south gains 100% of the solar radiation available. A tilt by 8° reduces this to 98%, 15° to 96%, 30° to 85% and 45° to 73%.
7. If lots have to be accommodated along a N-S street, adopt flag-shaped lots to allow staggering layout of homes.
8. Lots may be skewed from street or alternatively houses may be skewed on lots in order to gain max. radiation.
9. Staggered dwellings cause overshadowing.
10. Garages should be placed to avoid overshadowing. It may be preferable to have an additional storey.
11. Keep dwelling shape simple-squarish or rectangular.
12. Optimum angle for a roof pitch suitable for retrofitting collectors is latitude plus 15° - for Ottawa, 60° .
13. Choose deciduous trees for shade in summer.
14. Evergreens help to reduce the negative affects of wind.
15. Aim to get still air between trees and dwelling on the north side.

Future parts of the guide:-

- II. Subdivision process for energy efficient site design.
- III. Shadow calculations for site planning.
- IV. Principles and quantification of heating requirements.
- V. Protection of solar rights.

- VI. Effects of energy-conscious planning on street and house design.
- VII. Basics of passive solar heating.
- VIII. Landscaping for energy conservation.
- IX. Local climate data.
- X. Sample house designs and anticipated heat loss.
- XI. Transportation energy conservation principles in site planning.
- XII. The effect of energy conservation on residential development standards.
- XIII. Solar access in medium density ground-related housing forms.
- XIV. Official plan statements, zoning by-laws and subdivision agreements for energy conservation by way of site design.

Useful references on p. 26.

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ONTARIO MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING
ONTARIO MINISTRY OF ENERGY
CITY OF OTTAWA

SOLAR ACCESS
PROTECTION FOR
BUILT-UP AREAS

SUMMARY



City of Ottawa

January 1984

ACKNOWLEDGMENTS

An early step in the long procedure to establish the feasibility of solar access protection in built-up areas and to develop a process by which it may be enacted by a municipality, was to set up local Advisory Committees on Solar Access. The Westboro Committee, among them, developed a method of working as a team of local experts, which is believed to open new in-roads in participatory planning. A debt of gratitude is acknowledged to all members of this Committee, as follows:-

Professor Peter Fitzgerald

Mr. David MacKay

Ms. Agnes MacIntosh

Mr. Chuck Jackson

Mr. Don Smiley

Mr. Fred Lambert

Ms. Betty MacKay

Special thanks are due to Mr. Glenn Tunnock, MCIP, who supervised this study on behalf of the Ministries of Energy and of Municipal Affairs and Housing.

Gary Armen

Senior Energy Planner

City of Ottawa

SOLAR ACCESS PROTECTION IN BUILT-UP AREAS

Summary

The objective of this study was to establish the feasibility and develop a process by which access to solar energy may be legally protected for every property, in built-up areas of a city. The method involved an investigation of the protection provided by current municipal zoning, a derivation of principles for further protection through the involvement of citizens and a trial application of these principles in order to evaluate the possible social, economic and environmental impacts of a Solar Access By-law.

A brief review of relevant literature indicated considerable scope for original research on the subject, in the areas of public involvement in the formulation of solar access protection principles and in the evaluation of the social, economic and environmental impacts of a Solar Access Protection measure.

A preliminary technical study established that current zoning left much to be desired in terms of solar access protection beyond roof surfaces. In order to encourage passive or active collection of solar energy, it was considered essential to protect solar access on south-facing walls and on parts of a lot. Experiments with the heliodon - an instrument that simulates the movement of the sun on various latitudes, seasons and times of the day - led to the realization that in already built-up areas, no measure could ensure solar access to all useful surfaces, on all properties. Given the density of an area, only experimentation with different solar envelope shapes could yield an optimum percentage of homes to be thoroughly protected. A 'solar envelope' defines the volume of developable space on a lot which will cause no obstruction on a protected surface of a neighbouring property.

In view of the multitude of factors requiring value judgements - on existing trees, streetscape and traditional architecture, for example - it was decided to formulate Solar Access Protection principles with public involvement. Public debate was initiated by the distribution of the preliminary technical study and the organization of public meetings in three areas of the City - Westboro, Glebe and Ottawa South - selected on the basis of local interest in solar energy utilization, relevant environmental features and loyalty of residents. Local advisory committees were formed and early working sessions indicated two legal approaches to solar access protection:

- (a) through the establishment of a new property right to such protection; and
- (b) through reliance on existing municipal zoning powers to regulate the intensity and shape of development on subdivided lots.

The former was considered to lie beyond the remit of this study, while the latter was developed as a set of principles (shown in Section 5 of this report) by the Westboro Committee.

Following discussion of these principles with a group of experts assembled by the Solar Energy Society of Canada Inc. and the City of Ottawa, the Westboro Committee presented them to their community, through an information campaign and two public opinion surveys. These produced a majority of 85.9% in favour of solar access protection and acceptance of 9 out of 12 principles. A final public meeting resolved the outstanding three principles as well.

The principles define a solar access envelope suitable for the residential densities and heights in Westboro, as a device to control building shape and volume. Provisions to control the extent and duration of shade produced by

signs, accessory buildings, fences and vegetation are also included, although their application will require enabling legislation from the Provincial Legislature.

Circulation and comment on these principles from 17 technical agencies and numerous organizations and experts resulted in some refinements and modifications. Planning Branch subsequently tested the performance of these principles by trial application over the entire City from April to July, 1983. The extension of the area of application - from Westboro to the entire City - brought a wider range of development proposals within the scope of the experiment and led to more reliable conclusions. The most important of these conclusions were that the majority of applications for renovation or new development already conformed* by incorporating solar design features and allowing solar access to neighbouring properties often by pure chance. The distribution of a SOLAR DESIGN GUIDE and the offer of design advice across the counter helped to increase the number of conforming applicants significantly.

The assessment of the impacts of a solar access protection measure for a city of the size of Ottawa concluded that administratively, the cost of employing a full-time energy planner, part-time building inspector and an hour-a-day secretarial assistance was a small price for a permanent benefit, in terms of greater energy efficiency and an open, airy environment, particularly as computerization held out the promise of further cost reduction.

* STATISTICAL NOTE: Out of a total of 2,346 cases examined (95.8% of them in the residential sector) nearly 60% conformed, 33% required slight change and only 7% required major change in design.

Economically, a mandatory by-law could require a reduction of up to 11% of the building volume of a proposal, but in the case of large sites, an additional 26% to 32% more dwelling units could have been accommodated, though at 7% to 12% higher cost for foundations. This meant a wider profit margin for conforming developers, although individual cases may vary considerably. Solar energy gains were estimated to save between 8% and 21% of all energy bills, throughout the life of the examined buildings. Impact on zoning and the value of sites would be nil in the case of areas zoned for 3-storey or lower development - i.e., the vast majority of Canadian urban areas - while in the case of more intensive development zones, the adverse effect would increase with height. Land owners could however, be compensated through the allowance of mixed land uses appropriate to a community, to promote energy efficiency through greater scope for multi-purpose trips and greater self-containment in general.

Socially, the impact of a solar access by-law appeared to be only beneficial, encouraging residents to be more aware and assertive in respect of their right to enjoy sunshine and use solar energy. Finally, the environmental impact of such a by-law could be seen only over the long-term of at least a generation of trees, when non-conforming vegetation could be replaced with 'habitat landscaping'. This will keep low-growth, deciduous vegetation on the south side of homes and allow evergreens on the north side. An important conclusion of the experimental application of solar access principles concerned the education of land surveyors, urban planners and other 'subdividers' of the raw land for development. Their education should lay emphasis on east-west orientation of streets is the most important factor in solar energy utilization and solar access for all homes.

As the experimental application of solar access principles proved the feasibility of a voluntary measure in all areas of Ottawa except downtown - where existing high development already precluded the enjoyment of sunshine in all but specially protected areas like parts of Spark Street - the City adopted the SOLAR DESIGN GUIDELINES attached to this Summary.

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CITY OF OTTAWA
Community Development Department

S O L A R D E S I G N G U I D E L I N E S

Planning Branch

August 1983

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SOLAR DESIGN GUIDELINES

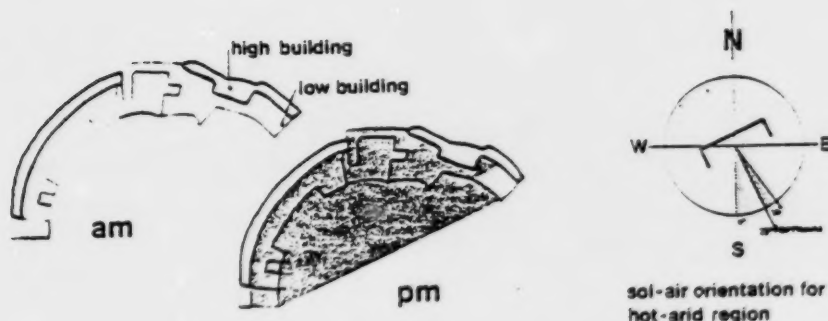
INTRODUCTION

All people feel a basic need for sunlight and one of the sunniest climates in Canada is to be enjoyed in the National Capital, Ottawa. With nearly 2000 hours of bright sunshine a year - a higher annual average than many holiday regions in the country - architects, developers and ordinary householders wishing to improve their property, could not remain indifferent to the benefits of solar energy.

This booklet provides some basic information on the design of various solar features to allow the penetration of sunlight where and when needed in and around a building and to the neighbouring properties. In an increasingly energy-conscious world, this allowance of opportunities to all property owners to exploit solar energy at some point in time, is the only fair and civilized approach to urban development.

The criteria set out in these GUIDELINES will be among the various considerations applied to development proposals by Planning (Land-Use and Development) and Buildings Branch and by the Committees of Adjustment, Design and Planning. Preliminary advice on any part of this booklet may be obtained at the Energy Advice Counter at City Hall (7th floor) or by calling:-

THE CITY ENERGY PLANNER: 563-3000.



PLAN OF PUEBLO BONITO, Chaco Canyon, New Mexico

Morning reception and afternoon control of solar energy, illustrates the use of sol-air orientation by the Pueblo Indians (919 AD) at the scale of an entire settlement.

S E C T I O N 1

SOLAR ENERGY UTILIZATION

People have been using solar energy from times immemorial, but only in crude and rather uneducated ways - sunbathing for hours on end, for example, regardless of the risk to health from skin cancer. The development of high technology and nowadays, the feasibility of minute measurements through microcomputers, allows greater scope for creative experimentation and comparison of various shapes and materials, to capture and use SOLAR ENERGY*.

This Section of the GUIDELINES explains briefly the present state of the art in solar energy utilization, defining the acceptable forms of such utilization for the protection of SOLAR ACCESS to a property and allowing scope for further experimentation. It is divided into the following parts:-

- a. Principles of solar energy utilization;
- b. Geometry for optimum utilization at Latitude 45° 29'N (Ottawa);
- c. Basic vocabulary of solar design features in buildings;
- d. Scope for further experimentation.

The emphasis throughout this Section is on optimal use of solar energy for domestic buildings, but many aspects will be found to be applicable to other types of buildings as well.

a. Principles of Solar Energy Utilization

It has been estimated that the quantity of solar energy received from the sun amounts to 30,000 times the total supplied by other sources to mankind (Lönnroth, 1977). The reason for the indifference to such a vast source is that solar energy is low in intensity and requires rather sophisticated HEAT STORAGE methods, which unfortunately have been lagging behind.

Note:* All terms written in capitals and underlined are explained in greater detail in the DEFINITIONS on p. 34.

The low intensity heat received from the sun, however - a mere 1.3 megajoules/sq. metre or 116 BTU per square foot of the earth, each hour, after allowing for various losses for passage through the atmosphere - is particularly suitable for domestic uses. For purposes of these GUIDELINES, there are five acceptable uses of this energy, for which solar access protection to neighbouring properties to a proposed development will be considered, in accordance with provisions set out in Section 2:-

1. Growing food;
2. Sunbathing;
3. Heating fluids - i.e. air and water;
4. Cooling fluids.
5. Converting solar energy into electric current or other forms of usable energy.

All of these uses depend on the effects of solar energy on plants, people, objects and fluids. The biological effects on plants and people fall outside the scope of solar design guidelines - suffice it to mention that temperature and radiation extremes are harmful to both. The effect on material objects and fluids is to heat them by the processes of CONDUCTION, CONVECTION and RADIATION.

SOLAR DESIGN is essentially the imaginative use of materials to control the reception of solar energy - in terms of light, heat and radiation - by managing the processes of conduction, convection and radiation. One of the most useful means for this management was discovered by the Swiss naturalist, Horace de Saussure, in 1767 and it still remains the most frequently employed means by all designers - the 'greenhouse effect'. Experimenting with insulated boxes of wood, covered with two and subsequently three layers of glass, he obtained temperatures of 110°C - i.e. well above the boiling point of water. The GREENHOUSE EFFECT involves:-

- i. Absorption of radiated solar energy through a transparent material and conversion to heat;
- ii. Conduction of heat to adjacent air or other fluid;
- iii. Convection of air, spreading the accumulated heat; and
- iv. Storage of heated air by means of insulation, in the form of:-
 - (a) a layer of air between two or three panes of transparent material on the sunny side(s); and
 - (b) insulating material on the other side(s) of the greenhouse 'box';
- v. Accumulation of carbon dioxide in the air, if plants are present in the absence of sunlight.

The crucial role of insulation in bringing about and subsequently reinforcing the 'greenhouse effect', should never be underestimated. A well-designed solarium on the south side of a badly insulated house, for example, will never make up for the deficiency in insulation. Design Committee will therefore require sufficient construction details, to ensure the provision of adequate insulation, in walls defining the spaces for which solar design features have been proposed. The accumulation of carbon dioxide in a greenhouse is a factor to be considered when planning the location of bedrooms. The passage of air from a greenhouse to a bedroom may be welcome during the day, but it should be avoided at night.

The greenhouse effect is the means employed in ACTIVE as well as PASSIVE solar collector systems:-

An ACTIVE SOLAR SYSTEM collects, transmits and stores solar energy as usable heat, by reliance on mechanical means or a chemical process - e.g. a mechanical fan or pump to circulate air or water heated through the greenhouse effect, created in a solar collector panel.

A PASSIVE SOLAR SYSTEM, on the other hand, collects and stores the heat accumulated through the greenhouse effect created by, say, a window, into the massive parts of a structure - concrete walls and floor slab, metal furniture or barrels of water - and subsequently releases it to surrounding fluids - air or water - through conduction and convection. Occasional assistance by a mechanical device to reinforce these processes may be used.

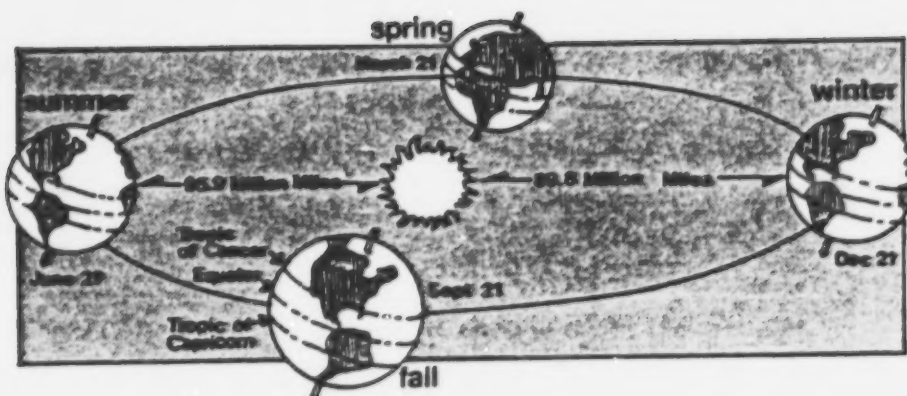
Both active and passive solar systems often need to have some heat storage capacity to be effective. This has proved to be the most formidable stumbling block to the progress of solar technology. Warming water or air under the sun has been used to collect solar energy from times immemorial, but how to keep them warm after sunset has proved very difficult. At present, a day and a half is about the maximum storage period and allowance for experimentation to prolong this period will be made in part (d) of this Section.

For purposes of these GUIDELINES, a solar collector will therefore be expected to carry out the functions of collecting and storing heat, by active or passive means, in order to be acceptable for solar access protection purposes under Section 2. A more complete definition of such a collector will be found in Part (c) of this Section.

9. Geometry for the Optimum Utilization of Solar Energy

At Latitude 45° 29' N (Ottawa)

Every latitude on earth imposes a particular geometry for the optimum utilization of solar energy. The reason is that the angle at which solar radiation is received on earth is a more important factor for the collection of energy than the distance between sun and earth. This is evident in the seasonal variation of heat received on the earth. (Diag. 1)



Diag. 1: SEASONAL VARIATION OF THE EARTH'S TILT AND DISTANCE TO THE SUN, DURING THE YEAR.

A location on the Tropic of Cancer, for example, receives more radiation in summer than a location on the Equator at the same time, despite the fact that the distance between earth and sun is 5.1 million miles more than when it is winter on the Tropic of Cancer.

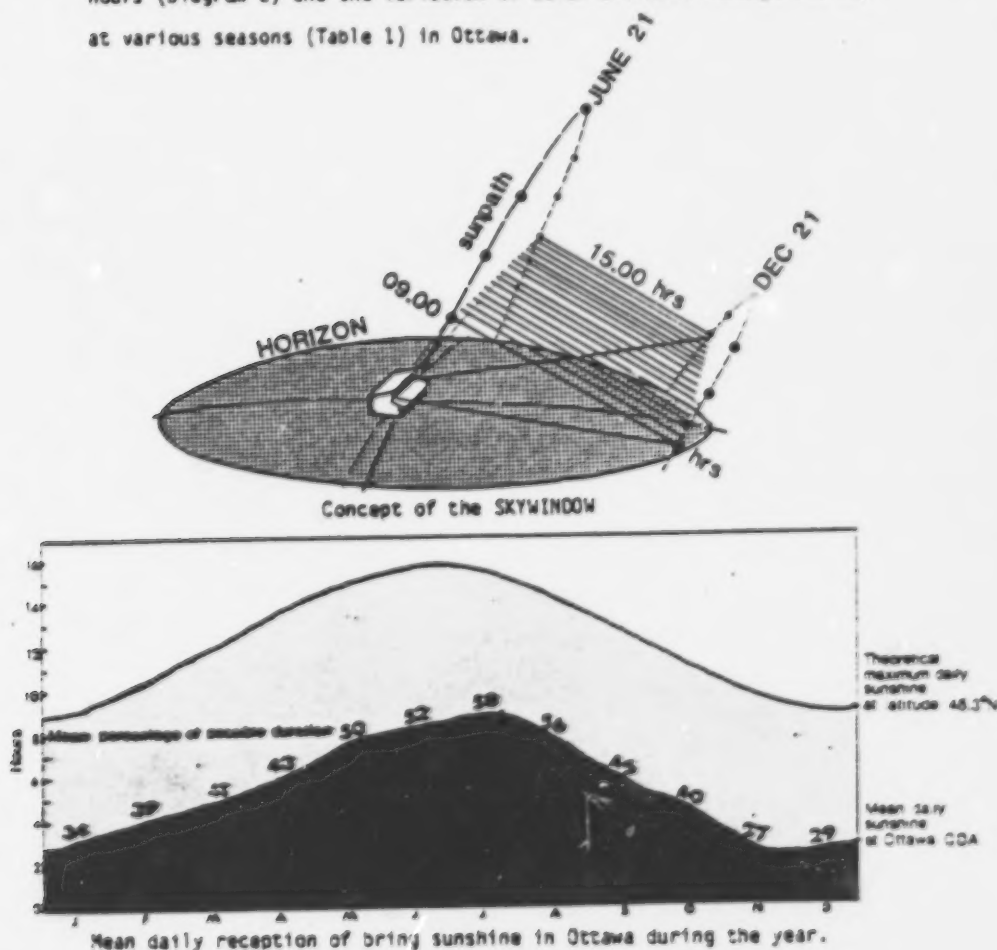
The angles of sunlight reception at any location in the northern hemisphere have been illustrated in many publications - see National Research Council (1967, 1982) and City of Hamilton (1982) among others in REFERENCES.

Diag. 2 shows the concept of the SKYWINDOW, which should theoretically be available at any point on the northern hemisphere for the utilization of solar energy. This window is formed by the highest and lowest sunpaths in the year (June 21st and December 21st respectively) defining the horizontal limits for the reception of useful sunshine and 9:00 a.m. to 3:00 p.m. - the middle best of the day, to receive the highest intensity of sunlight - defining the vertical ones. The second part of Diag. 2 shows that even without considerations of obstruction by buildings or trees, the cloud and other weather factors affecting a particular location like Ottawa, allow only a percentage of the theoretical maximum of sunshine available through the skywindow for utilization.

The most advantageous angle of reception for the collection of solar energy is naturally 90° - i.e. when the rays hit a collector surface as perpendiculars. This may not, however, be the optimum angle for other domestic purposes like growing plants or sunbathing. It would therefore be worthwhile to define the acceptable angles of solar radiation reception for purposes of these GUIDELINES:-

1. For solar collectors and converters (PHOTOVOLTAIC CELL panels).

Whenever it appears financially viable, designers may consider tracking mechanisms which may rotate or tilt the collector to face the sun always at 90° . If only rotation is allowed for, the tilt should be fixed at 60° or, more precisely, $60^\circ.29'$, in accordance with the formula:- 'Latitude + 15° ' to allow for the mean of daily sunshine hours (Diagram 2) and the variation of solar altitude through the day at various seasons (Table 1) in Ottawa.



Diag. 2: CONCEPT OF THE SKYWINDOW AND RECEPTION OF SUNSHINE IN OTTAWA.

Table 1: SEASONAL AND DIURNAL VARIATION OF SOLAR ALTITUDE IN OTTAWA (LATITUDE: $45^{\circ}29' N$)

<u>TIME</u>	<u>AZIMUTH</u>	<u>ALTITUDE</u>	<u>SEASON</u>
Noon	$180^{\circ}.0'$	$21^{\circ}.30'$	Winter
9:00 am/3:00 pm	$139^{\circ}.0'$	$10^{\circ}.0'$	
7:40 am/4:20 pm	$124^{\circ}.30'$	$0^{\circ}.0'$	
Noon	$180^{\circ}.0'$	$45^{\circ}.0'$	Fall and Spring
10:00 am/2:00 pm	$141^{\circ}.0'$	$38^{\circ}.0'$	
8:00 am/4:00 pm	$112^{\circ}.0'$	$20^{\circ}.30'$	
6:00 am/6:00 pm	$90^{\circ}.0'$	$0^{\circ}.0'$	
Noon	$180^{\circ}.0'$	$68^{\circ}.30'$	Summer
11:00 am/1:00 pm	$145^{\circ}.30'$	$65^{\circ}.30'$	
10:00 am/2:00 pm	$121^{\circ}.30'$	$57^{\circ}.30'$	
8:00 am/4:00 pm	$93^{\circ}.0'$	$37^{\circ}.30'$	
4:20 am/7:40 pm	$55^{\circ}.30'$	$0^{\circ}.0'$	

If only tilting is allowed for, then the collector may be fixed in a direction that will collect the optimum percentage of solar radiation shown on Table 2, for the space enclosed:-

Table 2: DIURNAL VARIATION OF SOLAR ENERGY RECEPTION IN OTTAWA (APPROXIMATE LATITUDE: 45°)

<u>TIME</u>	<u>% RADIATION*</u>				<u>EXAMPLE+</u>
09:00			10.7	....	Breakfast Room
10:00			14.4	....	
11:00			15.9	....	
12:00			16.2	....	Greenhouse
13:00			15.8	....	
14:00			14.4	....	Solarium
15:00			10.7	....	Living Room

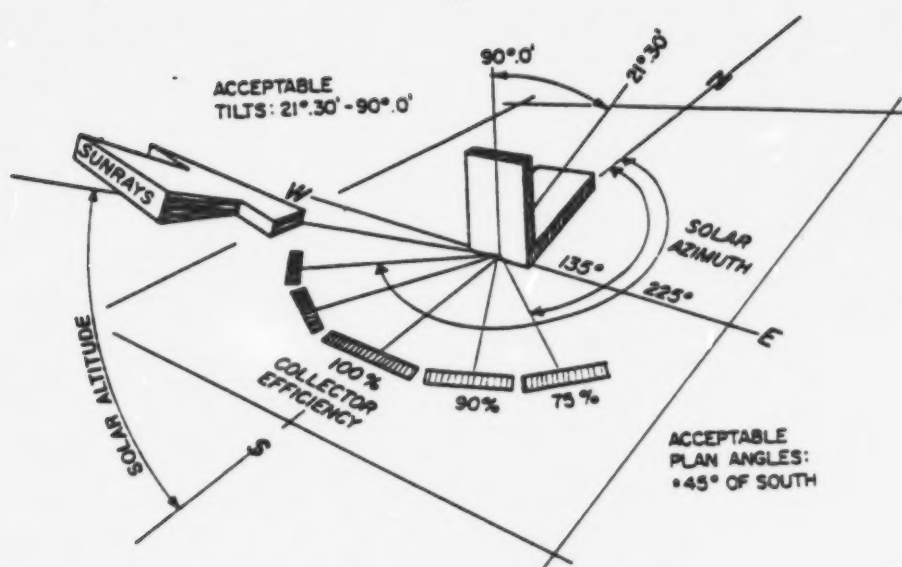
NOTES: * This figure represents the percentage of total radiation available during that day.

+ This example indicates the type of enclosed space for which the energy received may be adequate.

Table 3: NET ANNUAL HEAT GAIN THROUGH GLAZED SURFACES IN OTTAWA (MJ/SQ. M) FACING PROFITABLE DIRECTIONS

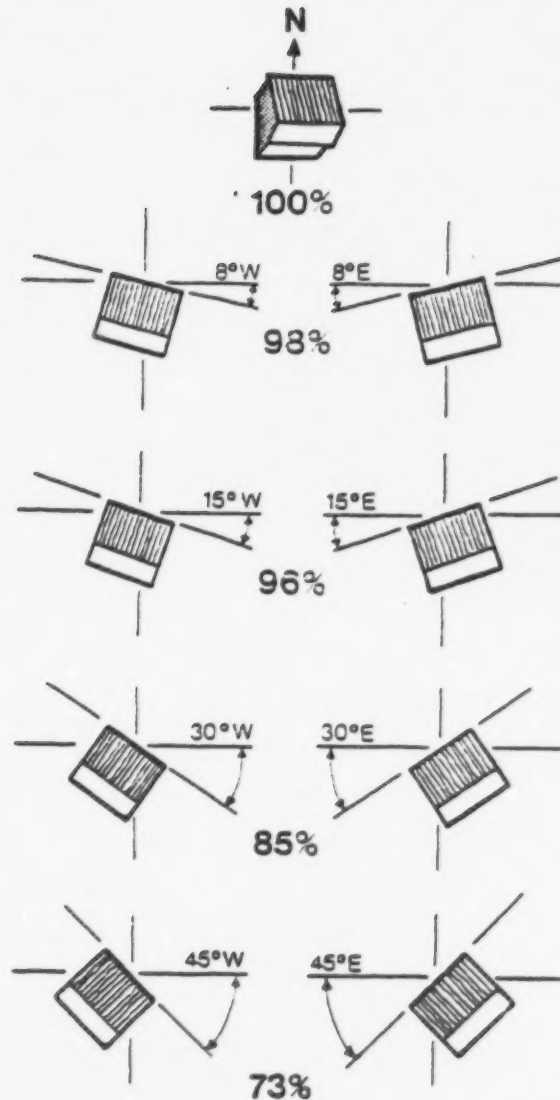
<u>GLAZING</u>	<u>SOUTHEAST</u>	<u>SOUTH</u>	<u>SOUTHWEST</u>
Single	+688	+426	+730
Double	+351	+585	+314
Triple	+641	+857	+607

NOTE: The percentage of solar radiation available outside the six hours indicated in Table 2 is almost negligible and not worth designing for. This implies that solar collector surfaces facing the sun at other than the profitable directions from southeast, through south to southwest (Azimuth less than 135° or more than 225° - see Diagram 3) collect little or no solar energy and, in fact, they may cause the loss of more energy than they gain during the 24-hour cycle. Such surfaces will not therefore be acceptable for solar access protection purposes as provided for in Section 2. Similarly, surfaces tilted at an angle of less than $21^{\circ}.30'$ to the horizontal (see Winter Noon Altitude on Table 1) will also be unacceptable - horizontal skylights, for example.



Diag. 3: ACCEPTABLE ANGLES OF SOLAR COLLECTOR PLACEMENT IN OTTAWA.

In conclusion, surfaces designed to collect solar energy should (a) face south at 90° and not less than 45° ; and (b) they may be vertical or tilted not less than $21^{\circ}.30'$ to the horizontal, in order to be acceptable for solar access protection under these GUIDELINES. The best means of obtaining these acceptable angles on a building is through ORIENTATION in accordance with the HANDBOOK for ENERGY EFFICIENT RESIDENTIAL SUBDIVISION PLANNING issued by the Ontario Ministry of Municipal Affairs and Housing, 1982. Diagram 4, reproduced from this Handbook, exemplifies the approach. For maximum comfort, designers may also consider the Ottawa SOL-AIR ORIENTATION of 12° South of West, or azimuth 168° , as explained by Olgyay (1963) and shown in Diag. 6. Other useful hints will also be found in the SOLARIUM WORKBOOK and the SOLARIUM PRIMER issued by the National Research Council.



A range of orientations from due south are possible while still providing excellent solar exposure. Dwellings can be oriented 15 degrees east or west of due south without significantly reducing the potential for solar heat gain. When sited 30 degrees off due south, the loss of potential direct solar radiation amounts to about 15 percent. Solar gains are progressively reduced as dwellings are shifted further away from due south.

As a general rule, an orientation slightly east of south is the preferred one for solar gain. This orientation increases solar radiation in the morning when the ambient temperatures are lower, and reduces radiation in the afternoon when the outside temperature has risen.

Given the range of possibilities, however, the best orientation on a particular site may depend on local conditions. In areas with morning mist, for example, a building orientation slightly further to the west may be preferred because the early morning sun is obscured.

Direct solar radiation gain (which is one component of the net heat load calculation) diminishes as house is oriented away from due south.

Diag. 4: DIRECT SOLAR RADIATION GAIN FOR VARIOUS BUILDING ORIENTATIONS
(Reproduced from: HANDBOOK FOR ENERGY-EFFICIENT RESIDENTIAL
SUBDIVISION PLANNING).

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2. For solaría, breakfast rooms, or other spaces in which the main activity to be accommodated is relaxation or sunbathing, designers may consider angles other than the ones stipulated above, in accordance with the temperature and radiation conditions desired in a particular space. The orientation of a solarium, for example, need not be south or even southeast or southwest. On the other hand, a north orientation would be absurd. Although designers are free to incorporate large glazed surfaces in any direction from west, through north, to east - for the sake of a view from a house, for example - any expectation of solar access protection would clearly make no sense. Objections to a development proposal in these directions in the vicinity of such a house will not therefore be considered by the Committees.

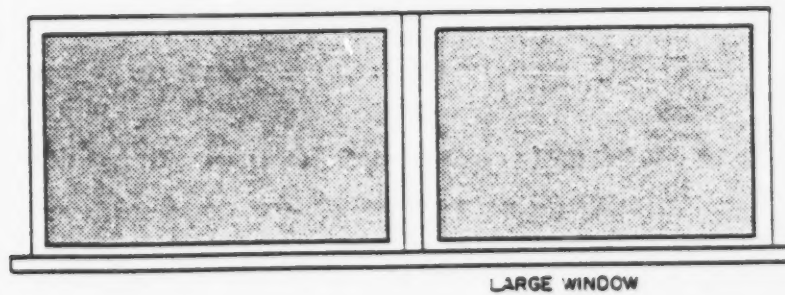
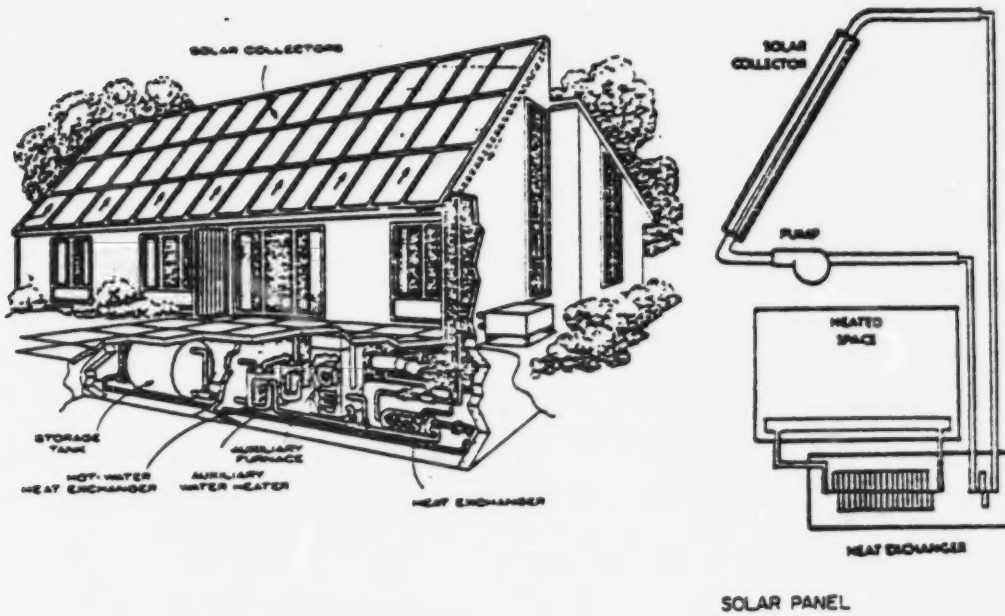
c. Basic Vocabulary of Solar Design

As already indicated under the Principles of Solar Energy Utilization, the most frequently employed means of collecting solar energy is by reliance on the 'greenhouse effect'. It is important to bear in mind that the greenhouse effect collects only heat, which is barely 16% of the energy received from the sun. The remaining 84% is light and the most advanced means of using this part of solar energy - photovoltaic cells - do not convert it to heat, but to electric current. The exposure requirements for a panel of photovoltaic cells are identical to those of a solar collector. Following discussion of the geometry of solar design for optimum utilization of solar energy in Ottawa, a general definition of a SOLAR COLLECTOR may now be given for purposes of these GUIDELINES, as follows:-

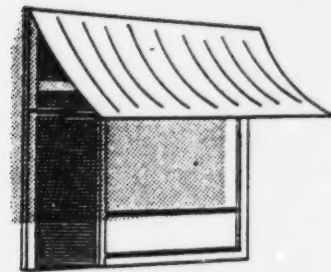
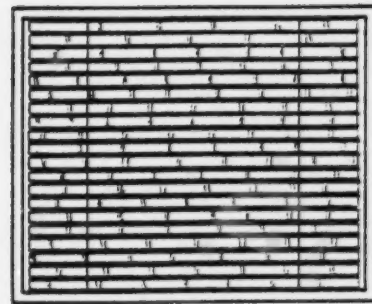
SOLAR COLLECTOR: A material surface exposed to sunlight at azimuths between 135° and 225° ; tilted to face the sun at any angle between $21^{\circ}.30'$ and $90^{\circ}.0'$ to the horizontal; and measuring at least 60 x 60 cm or 3600 square centimetres in area, to form the cover to an enclosure, in which by passive or active means, it collects a useful form of energy.

In addition to solar collector and photovoltaic cell panels, this definition covers large double- or triple-glazed windows, greenhouses, solariums, enclosed balconies, 'scoops' and any other enclosures in which the greenhouse effect is created, or sunlight is converted to some useful form of energy (Diagram 5). The 'solar collector', as defined above, may be used for space and water heating or cooling, by the use of a variety of circulation media, ranging from water and antifreeze mixtures to freon gas. In the case of relaxation spaces, the glazing exposed to the sun need not be double-glazed and a variety of filters or screens may be used to control the amount of solar radiation admitted into a space (Diagram 6). The vocabulary of solar design includes also external spaces designed for the purpose of relaxation and the enjoyment of sunshine (Diagram 7). It is important to emphasize that solar access protection to these spaces may be ensured either by including them in the 'solar envelope' of a property (See Diag. 9) or by incorporating them in the 'protected garden' (See Diag. 11) of that property.

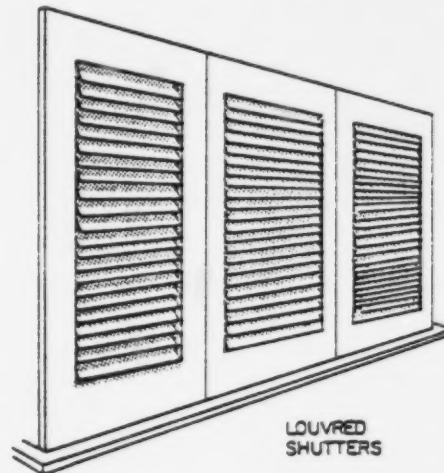
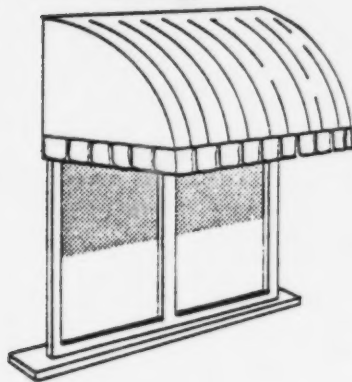
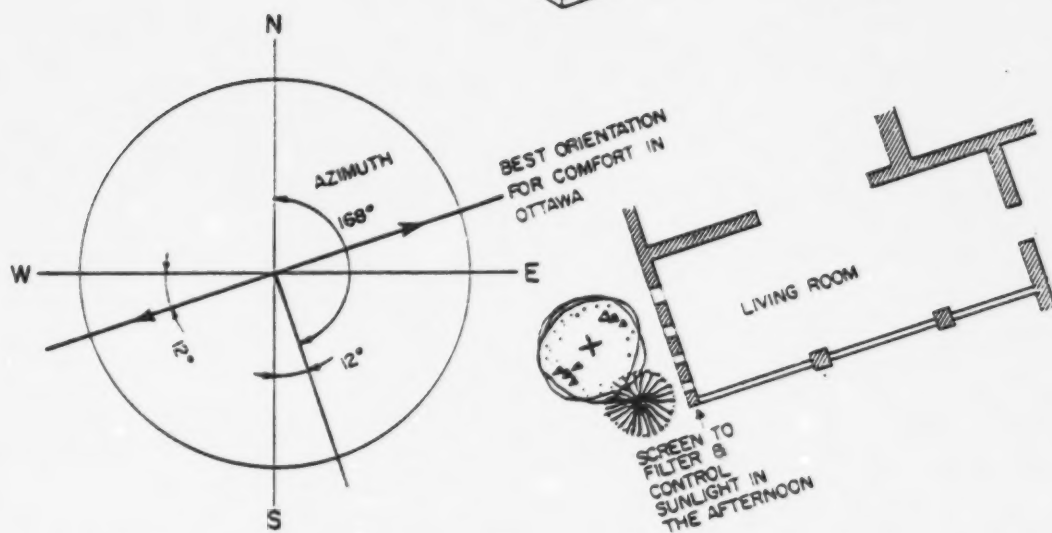
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Diag. 5: EXAMPLES OF SOLAR COLLECTORS.

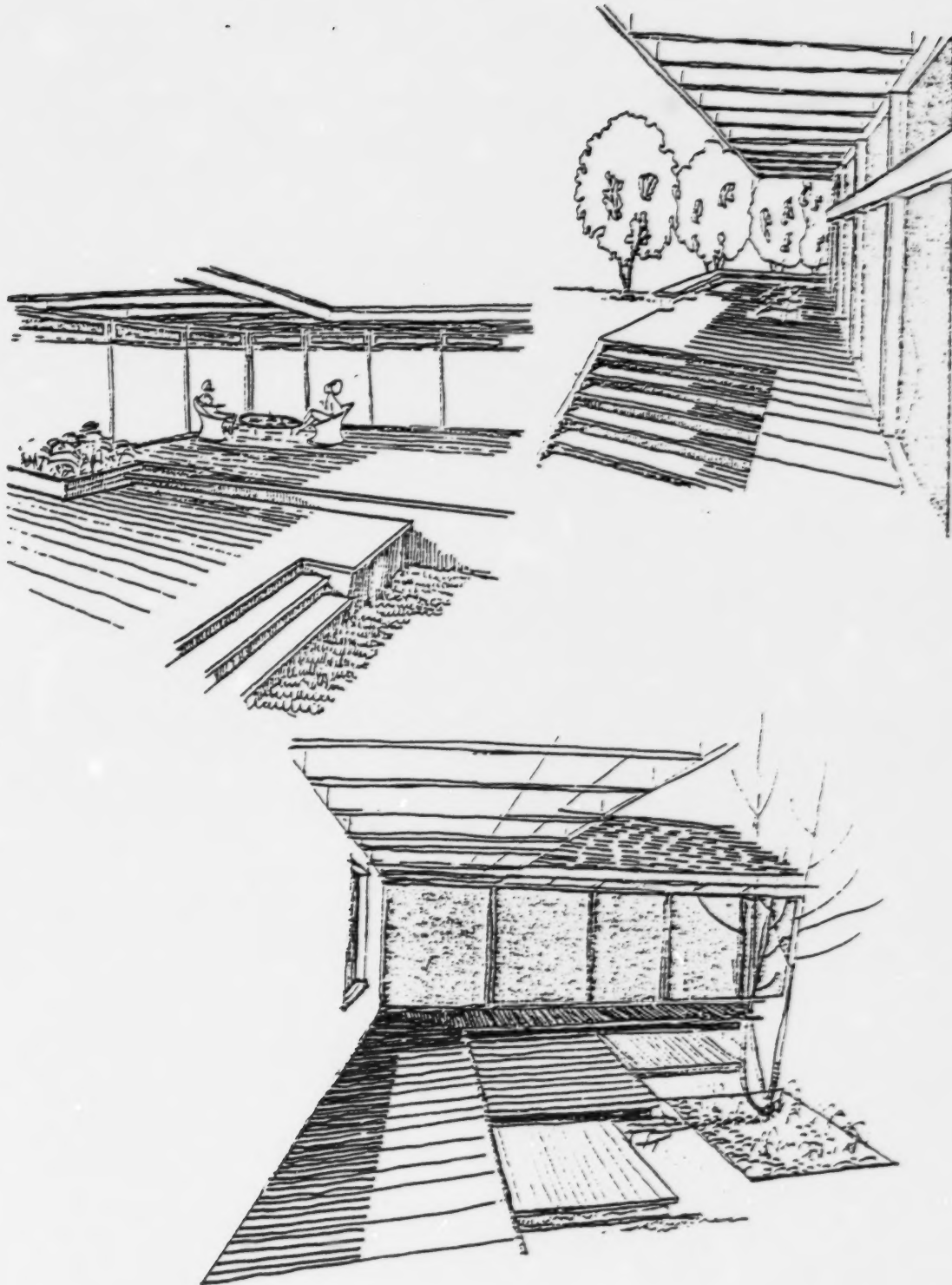
CANVAS
AWNINGS

BAMBOO SCREEN

LOUVRED
SHUTTERS

Note: The SOL-AIR ORIENTATION ensures comfort by the absorption of solar energy in the morning and the control of solar radiation in the afternoon hours, if a screen is incorporated at the position show above.

Diag. 5: SCREENS FOR SOLAR RADIATION CONTROL AND SOL-AIR ORIENTATION FOR OTTAWA

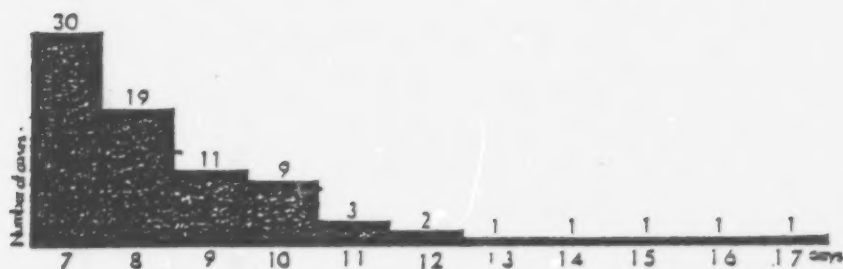


Diag. 7: EXAMPLES OF EXTERNAL SPACE DESIGNED FOR THE ENJOYMENT OF SUNSHINE.

d. Scope for Further Experimentation

Nothing in these GUIDELINES should inhibit designers from experimenting with novel shapes and materials to help extend the basic vocabulary of solar design.

As indicated in Part (a) above, the greatest scope for advancement is to be found in solar energy storage methods. A reservoir of water, thoroughly insulated and sealed may provide 1 1/2 day's storage, which is not sufficient to last over the 17 days of the longest cold spell occurring in January in Ottawa (Diag. 8). An alternative is the use of EUTECTIC SUBSTANCES like hydrates of salt, which according to experiments, if stored in a reservoir of 125 gallons in an insulated basement of a house, could extend the heat storage period to 5 or 6 months. Some eutectic salts however - e.g., Glauber's salt - have been found to have limitations in the number of times they will convert from solid to liquid state, to store heat.



Cold spells lasting -or less the above number of consecutive days

Diag. 8: DURATION OF COLD SPELLS IN OTTAWA.

A further area of experimentation is the modification of sunshine intensity through screens of variable mesh, to provide a measure of control. The proper location of any screen is on the outside of a glass pane - as in the case of the traditional louvered shutter - in order to prevent the accumulation of heat inside. Reflective materials may be used as screens, to help minimize the absorption of heat in summer.

S E C T I O N 2

SOLAR ACCESS PROTECTION

If property owners in the City are to be encouraged to invest in solar energy exploitation, evidently their right to receive and enjoy sunshine on their property for a viable number of hours must be protected. Solar access protection on a particular lot implies the following types of control:

1. Control on the shape and volume of building development on the neighbouring lots;
2. Control on site coverage on all lots;
3. Control on the extent and duration of shade by signs, accessory buildings, fences and vegetation located on neighbouring lots.

THE FOLLOWING ARE GUIDELINES FOR THE EXERCISE OF THESE CONTROLS BY APPLICANTS AND THEY CONSIST OF A DEFINITION OF KEY TERMS, PRINCIPLES AND METHODS OF APPLICATION.

182 CONTROLS ON BUILDING SHAPE, VOLUME AND COVERAGE

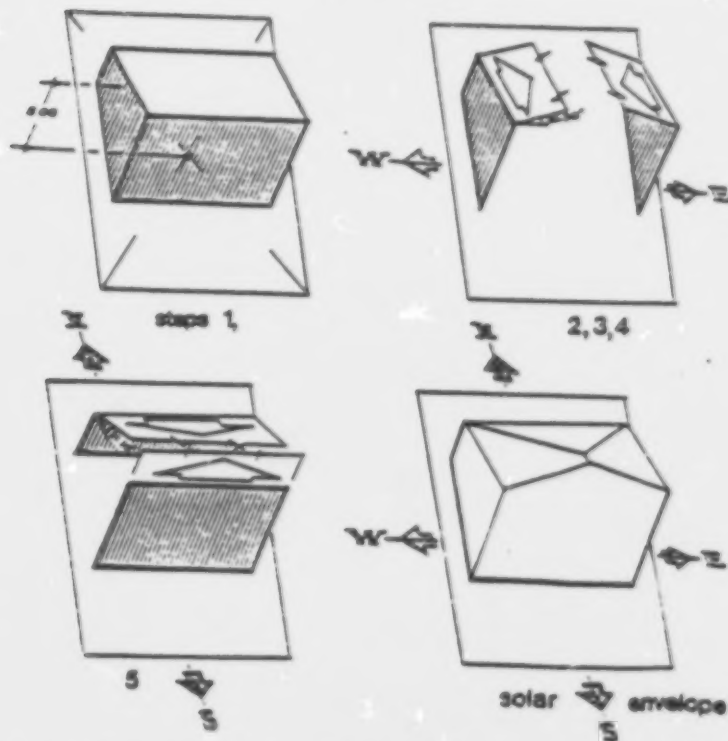
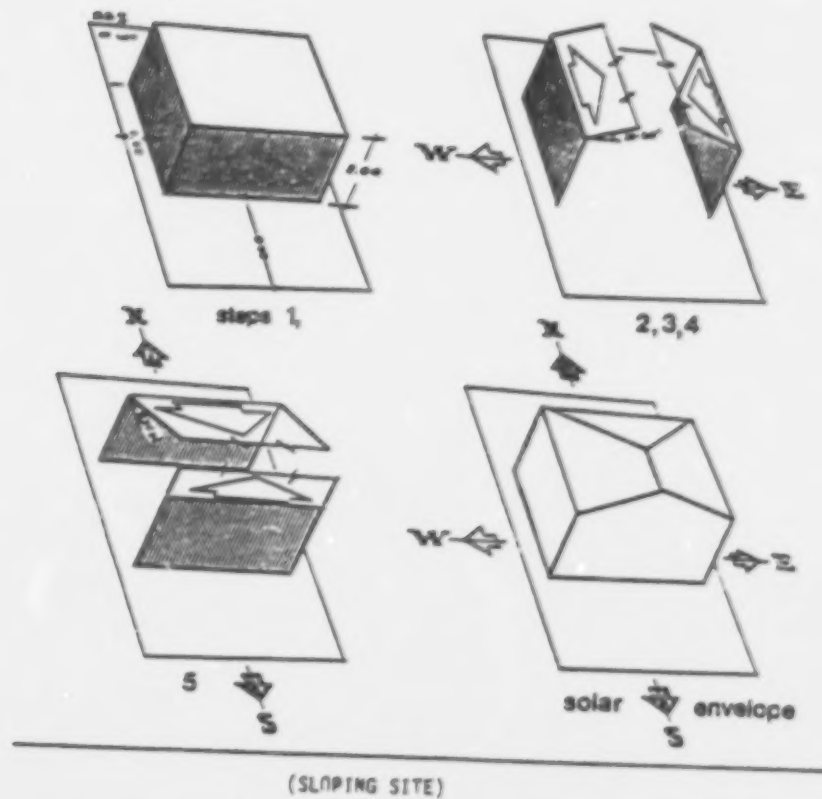
In order to protect solar access to neighbouring properties, the shape, volume and lot coverage of proposed development should be designed in accordance with the SOLAR ENVELOPE, as explained below.

A. Definition and procedure for drawing the SOLAR ENVELOPE for a site

The 'building envelope' defined in AZ-64, to contain the maximum development permissible on a lot, may be drawn by marking the vertical planes along the front, side and rear setbacks and assuming a horizontal ceiling of development at the maximum building height permissible in a particular zone. This 'building envelope' may be modified to become a SOLAR ENVELOPE, as follows:-

- i. A maximum eaves height should be assumed at 8.00 m above average ground level in any lot (see Step 1 for level and sloping sites on Diagram). The objective of this height is to avoid casting shade on buildings across a street or across back gardens.
- ii. Along the east, west and north sides of the lot, the ceiling of development should be sloped at an angle of $21^{\circ}30'$ with the horizontal, to extend from the above-mentioned maximum eaves line to the centre of the lot, to intersect with the horizontal plane at maximum permissible building height (Steps 2, 3, 4). The objective of the slopes on the ceiling of development is to maximize the penetration of sunshine in built-up areas.
- iii. Along the south side of the lot, the vertical plane along the setback line should be extended upwards to meet the sloped ceiling of development and the horizontal plane at maximum permissible building height. (Step 5).

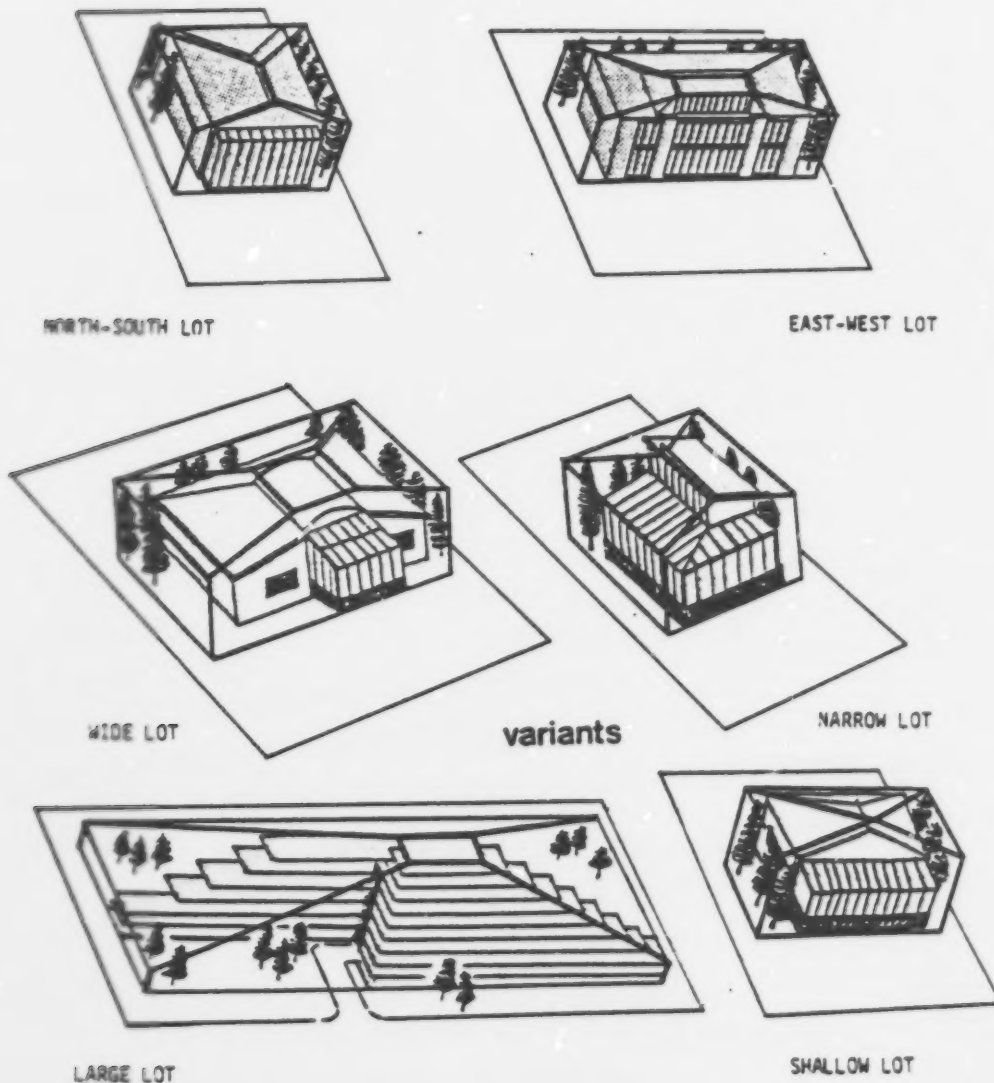
CONSTRUCTION OF THE SOLAR ENVELOPE (LEVEL SITE)



Diag. 9: CONSTRUCTION OF A SOLAR ENVELOPE ON A LEVEL OR SLOPING SITE.

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This procedure may produce a variety of shapes to allow sunlight penetration in accordance with lot orientation, depth and size, as shown below:-



Diag. 10: VARIANTS OF THE SOLAR ENVELOPE

B. Application

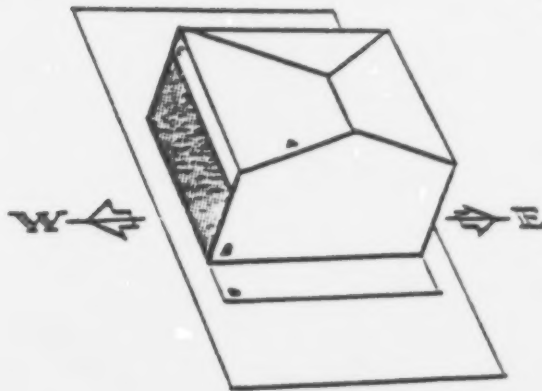
All new development, or addition to an existing development, should be contained within the solar envelope appropriate to the subject lot.

If compliance with the GUIDELINES results in a minor deviance from the requirements of AZ-64, an application may be made to the Committee of Adjustment for a variance from the provisions of AZ-64.

3. SHADE CONTROL

A. Definitions

- (i) **SHADE CONTROL:** A control on the duration and area of shade produced, or likely to be produced, on a 'protected surface' by proposed building development, sign or growing vegetation.
- (ii) **PROTECTED SURFACE:** A surface exposed to sunlight by virtue of its location on the following planes of a 'solar envelope' (as defined in CONTROLS 1 and 2).



- A. The sloped or horizontal planes of the envelope ceiling;
- B. The south vertical plane;
- C. A 100 cm deep strip on the east and west planes;
- D. 10% of the lot area on the south side of the property, or any other reasonable location selected and registered by the owner with the City Energy Planner, to be referred to as 'PROTECTED GARDEN'.

Diag. 11: PROTECTED SURFACES ON A SOLAR ENVELOPE.

The objectives of protecting part of the lot area as a 'protected garden' are as follows:-

1. To extend protection to sun decks or vegetable gardens which may not be part of the building structure;
2. To compensate for the overshadowing of south facades to homes built along an existing north-south street, by extending solar access protection elsewhere on their lot.

Note: The objective of relocating a 'protected garden' should not be to restrict development on an adjacent lot, but to compensate for inadequate solar access on 'protected surfaces' A, B and C, due to existing development or vegetation. Solar access to a relocated 'protected garden' will be protected through spot performance zoning stipulations on the relevant adjacent lots.

- (iii) EXEMPTIONS FROM SHADE CONTROL: All existing buildings, accessory structures, signs and designated or listed vegetation shall be exempt from shading control.

B. Principles

- (i) REGISTRATION of the transfer of a PROTECTED GARDEN: A protected garden should be assumed to adjoin the south side of the principal building on a lot. It should measure the full dimension of that building on that side, multiplied by the appropriate width to give an area equal to 10% of the lot area.

Note: Part or the whole of a protected garden may be transferred to any other part of a lot, by application for a Registered Transfer to the City.

Within twenty-one (21) days of receipt of an application, the City will notify and request comment on the proposed transfer from the owners of properties on the east, south and west sides of the subject lot.

The location determined after due consultations, will be entered on a Map of Registered Transfers of Protected Gardens in the City of Ottawa, which will be available for inspection at all reasonable times.

-
- (ii) PERMIT FOR THE INSTALLATION OF A SOLAR COLLECTOR: A property owner or agent wishing to retrofit one or more solar collectors on an existing structure, should submit an application for a Permit, including a drawing of the entire installation in plan(s), elevation(s) and section(s).

New development which is to incorporate solar collectors, as defined in A (iii) above, will require no special permit for their installation.

Note: All applicants should ensure that an existing or new structure has a safe margin of additional bearing capacity and stability to bear the proposed collector(s).

All applicants should produce and submit a photographed panoramic view showing the structures, signs and vegetation on the east, south and west sides of the subject lot, taken at eye level, while standing in the middle of the 'protected garden'. This panoramic view will be filed with the application for future reference on shade control, to protect solar access for the property in case of vegetation growth or building development in the vicinity.

The location of a collector should be determined with due consideration of the distance, foliage characteristics and rate of growth of any existing vegetation in the vicinity.

- (iii) VARIANCE, NOTIFICATION AND REPRESENTATIONS: A variance should be sought from the Committee of Adjustment for any minor deviance from the requirements of AZ-64, due to compliance with these GUIDELINES. A proposed sign, development, or part of a development, which exceeds the volume of the Solar Envelope on the subject lot should cast no shadow obstructing more than 15% of the area of a solar collector on a protected surface in a neighbouring lot, at any time from 9:00 a.m. to 3:00 p.m.

Note: Diagram(s) of the shade to be cast by the proposal on December 21st at hourly intervals from 9:00 a.m. EST to 3:00 p.m. EST, will be produced by Council and within 21 days of receipt of the Application for Variance, circulated with the appropriate notification to all residents affected by the shades projected on the diagrams. The notification should explain the proposal and the procedure for making representations.

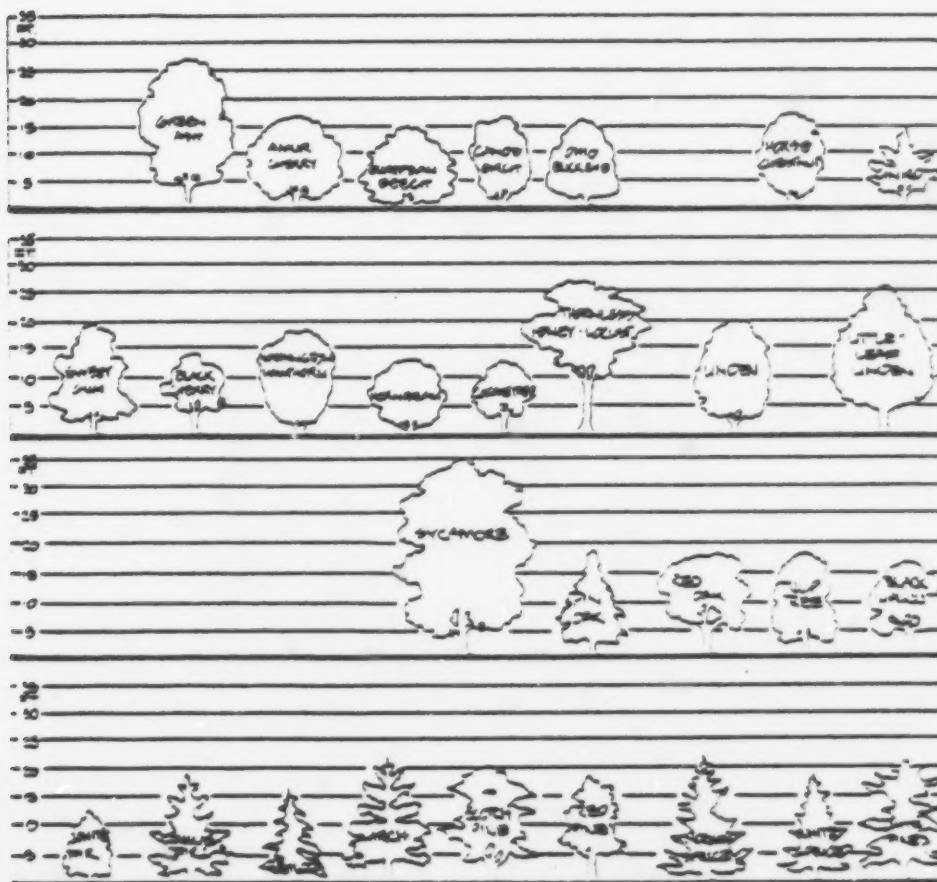
Any objection by a resident to the shading, likely to be cast on a protected surface by a proposed development, may be presented at the Planning Committee meeting on the case, unless the applicant modifies his/her proposal to the satisfaction of the Council.

- (iv) OBSTRUCTION BY GROWING VEGETATION: New vegetation which, through natural growth after the adoption of the present GUIDELINES by Council, exceeds the permitted 15% obstruction of sunlight on a solar collector on any day of the year, will be liable to thinning or cutting and removal of the parts casting the objectionable shading. Should the owner of the solar collector object to this shading, he may notify the trespass to the City. Following certification of trespass, the City will send 90 days' notice to the owner of the vegetation specifying the part(s) to be removed within that period.

Note: Failing compliance within the specified period, the City will convene a meeting between the owner of the collector and the owner of the vegetation.

- (v) NEW VEGETATION: Following complete removal, any replacement of the vegetation should preferably be located within the solar envelope for the subject lot and conform as regards ultimate height and volume. The following species of trees, if planted outside this envelope are considered undesirable: Willow (*Salix*), White Ash (*Fraxinus Americana*), Elm (*Ulmus*), and all types of Poplar (*Populus*).

- (vi) FENCES AND HEDGES: Property line fences, exceeding the permitted 15% obstruction of sunlight, should conform to these provisions.



Diag. 12: TREE FORMS AND HEIGHT OF RECOMMENDED TREES (after 10 years of growth)

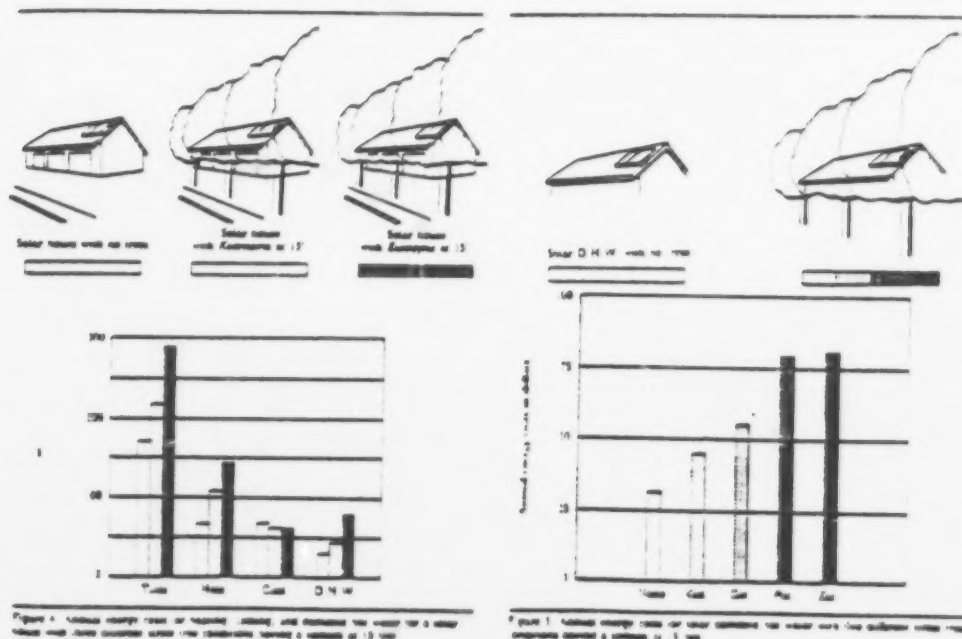
Source: Trees for American Gardens (Wyman, D. (1955) pp 101-102).

- (vii) Nothing in these GUIDELINES should prevent a property owner from planting any vegetation of his choice, which may screen, control or filter the sunlight falling on buildings located on his or her own property, in accordance with SOL-AIR ORIENTATION principles illustrated on Diag. 6

C. Application

The shade cast by a sign, chimney, dormer, mechanical equipment on the roof, fence, garage, accessory building, or part of a building erected after January 1, 1984, or by a vegetation planted after that same date, shall not exceed 15% of the area of a solar collector on a protected surface of a neighbouring property.

All existing signs, chimneys, dormers, fences, garages and accessory buildings are exempted from these provisions.



Diag. 13: EFFECT OF TREE SHADING ON ENERGY COSTS

Source: Modeling the effects of Street Trees (Thayer et al., (1988) pp 161-163).

S E C T I O N 3

ADMINISTRATIVE PROCESS CHARTS FOR THE APPLICATION OF THE
SOLAR DESIGN GUIDELINESPreamble

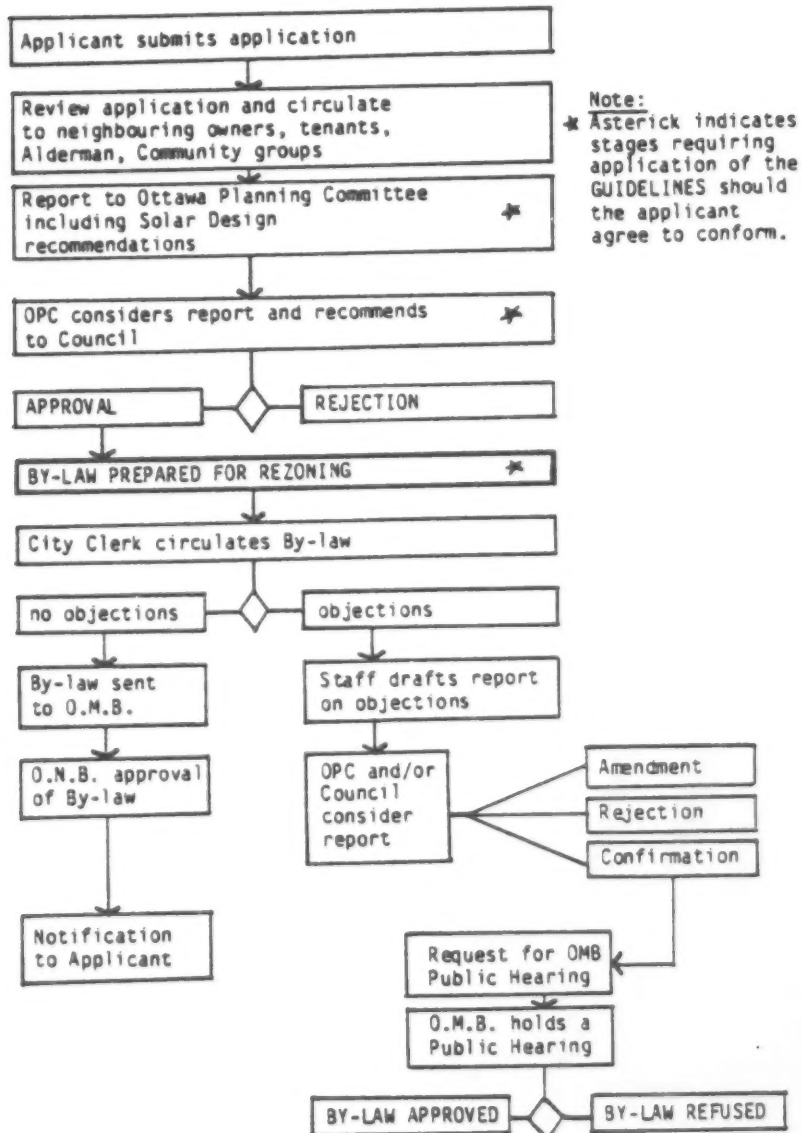
The administrative processes for the application of the GUIDELINES to proposed development in the City, may be divided into four parts as follows:-

- A. Application as part of the Zoning process;
- B. Building Permit issue procedure;
- C. Site Plan Control;
- D. Procedures which arise from the application of the GUIDELINES.

A chart will illustrate each of these procedures to help applicants follow the progress of their proposal, as it is examined for conformance by various Divisions of Planning and Buildings Branch.

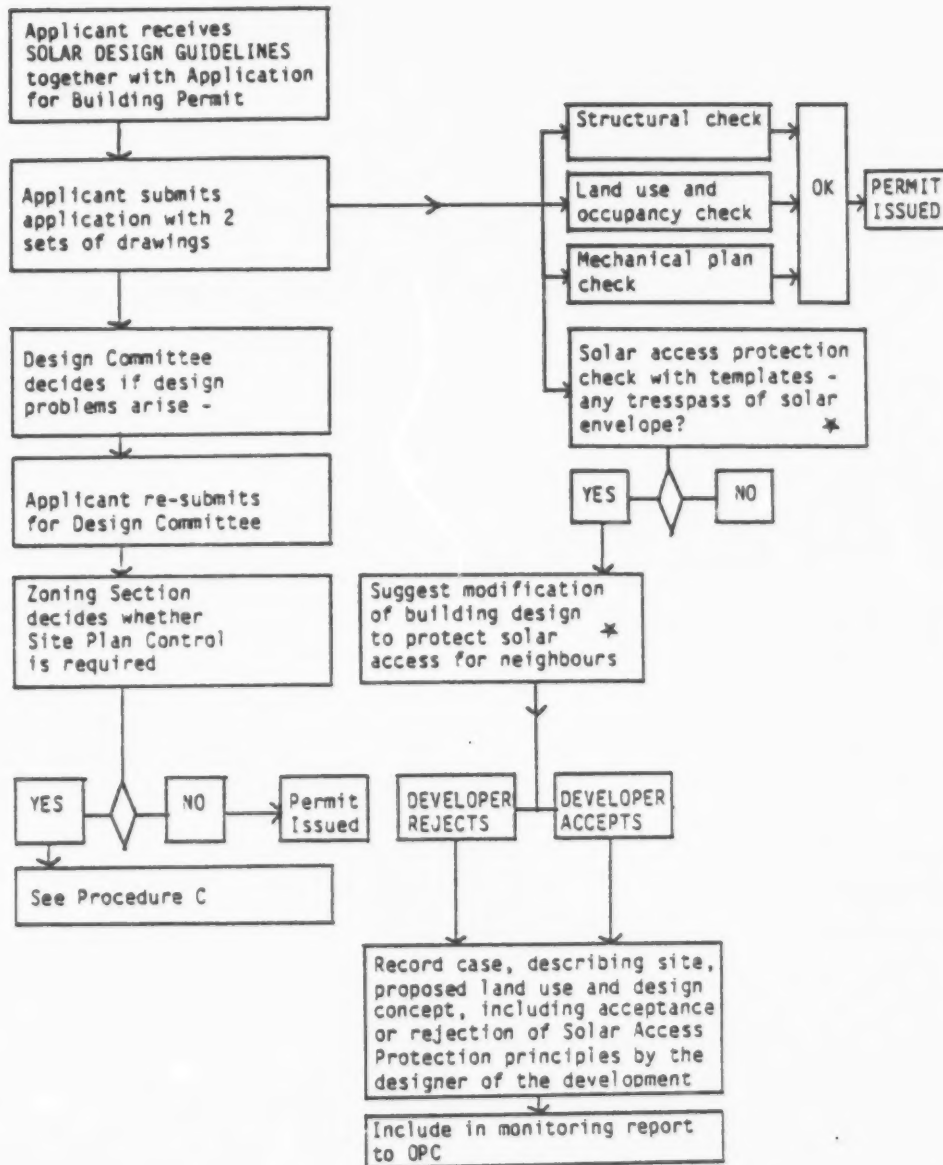
PROCEDURE A

APPLICATION FOR ZONING OR REZONING A PROPERTY



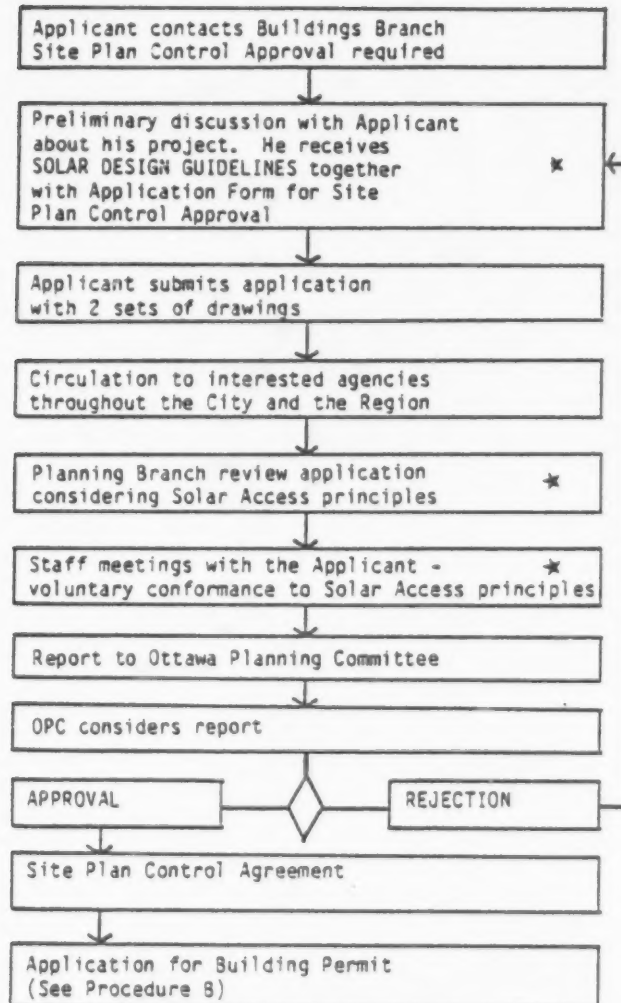
PROCEDURE B

APPLICATION FOR A BUILDING PERMIT



PROCEDURE C

SITE PLAN CONTROL



PROCEDURE D (i)APPLICATION FOR THE TRANSFER
OF A PROTECTED GARDEN

Applicant proposes transfer
to City Energy Planner (CEP)
stating reasons and suggesting
alternative location(s)

Preliminary investigation on
feasibility of transfer by CEP
and notification to neighbours
on the East, South and West
(E.S.W.) within 21 days of
application

Note:

ESW stands for East, South, West

Comment by neighbours E.S.W.

AGREE

DISAGREE

Site meeting between applicant,
neighbours and CEP to agree
on Solar Envelope modifications
necessary for transfer of
applicant's Protected Garden

Report to OPC including
recommendation on transfer
and performance zoning
amendments on solar
envelopes of neighbouring
lots ESW

OPC recommends to Council

Council decision on transfer
and Zoning amendment

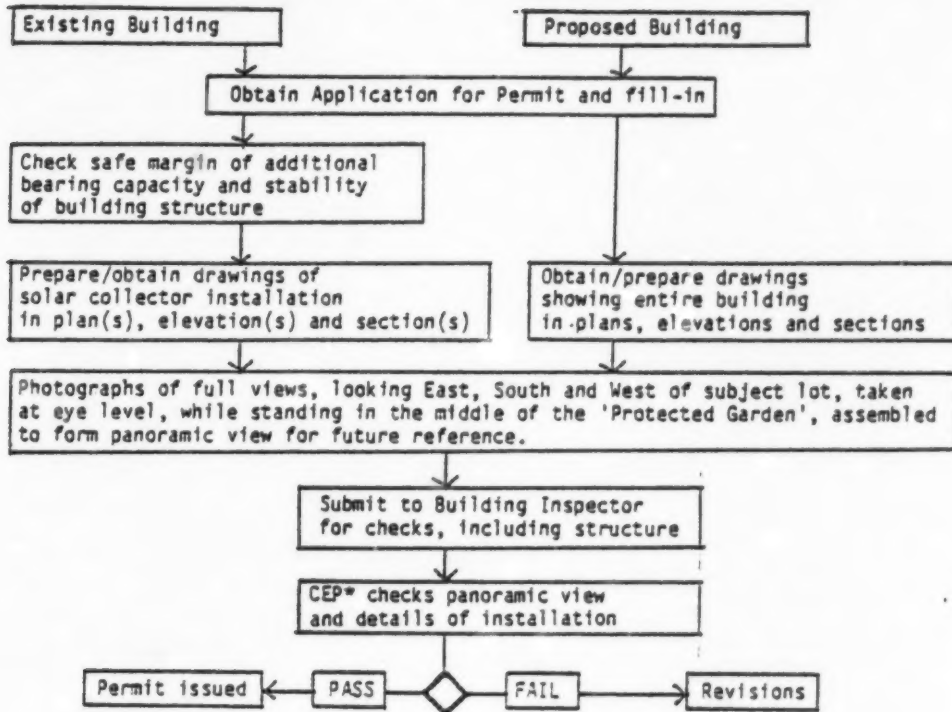
NO

Notification
to
Applicant

YES

Entry of transfer on
MAP OF REGISTERED TRANSFERS
OF PROTECTED GARDENS

Notification with copy of
zoning amendment to applicant
and neighbours ESW, advising
registration on property titles(s)

PROCEDURE D (11)APPLICATION FOR A PERMIT
TO INSTALL A SOLAR COLLECTORNote:

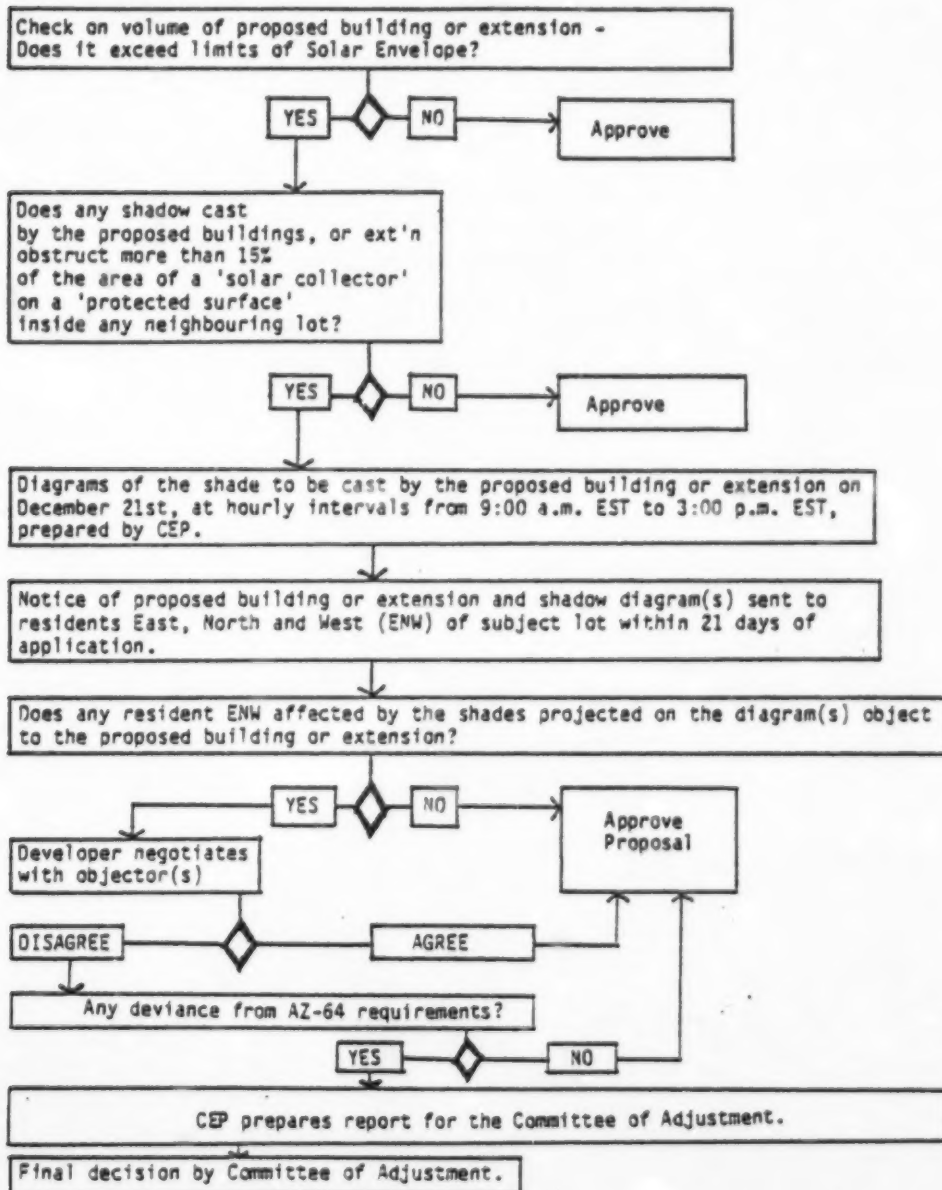
CEP* = City Energy Planner

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PROCEDURE D (iii)

OBSTRUCTION OF SUNLIGHT BY A DEVELOPMENT PROPOSAL

VARIANCE, NOTIFICATION AND PUBLIC HEARING

Note:

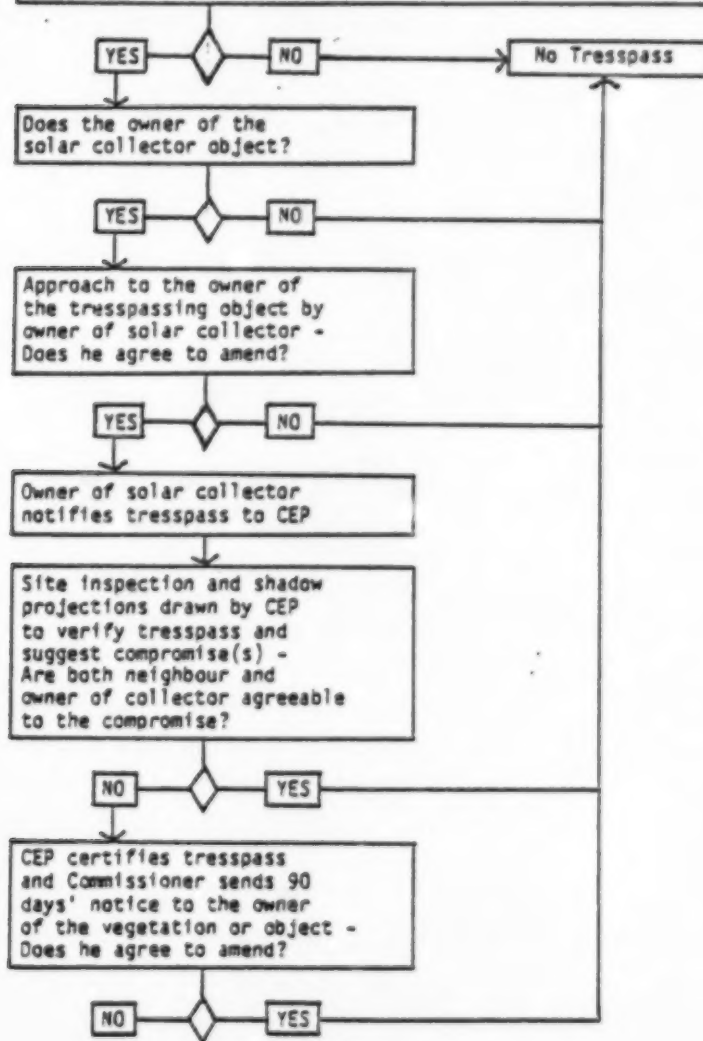
CEP* = City Energy Planner

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PROCEDURES D (iv), (v) and (vi)

OBSTRUCTION OF SUNLIGHT BY NEW VEGETATION, FENCES, SIGNS AND OTHER OBJECTS

Shade cast by a vegetation or other object on a solar collector, installed on a 'protected surface' inside a neighbouring lot - Does it measure more than 15% of the area of the collector?



D E F I N I T I O N S

ACTIVE SOLAR SYSTEM:	A system which collects, transmits and stores solar energy as usable heat, by reliance on mechanical means or a chemical process.
CONDUCTION:	The transmission of heat through a solid material, or from a solid to a fluid which are in direct contact with each other.
CONVECTION:	The movement set up in a fluid by the reception or loss of heat, to spread the resulting higher or lower temperature throughout its volume.
EUTECTIC SUBSTANCE:	A substance capable of changing its phase state from solid to liquid and from liquid to gas, in accordance with the quantity of heat absorbed - e.g., ice; water; steam.
GREENHOUSE EFFECT:	See pp. 4 and 5.
HEAT STORAGE:	Retention of the heat absorbed from any source for as long as possible. Current technology relies on enclosed or thoroughly insulated solid (e.g., pebbles), fluid (e.g., air), or eutectic substances. Reversible chemical reactions are also a promising avenue.
INSULATION:	Solid or fluid substances or a combination of both, able to resist the flow of heat.
ORIENTATION:	Direction of the longest axis of a structure.
PASSIVE SOLAR SYSTEM:	A system which collects and stores the heat accumulated through the greenhouse effect in an enclosure, into the massive parts of the structure forming that enclosure and subsequently releases the heat to surrounding fluids through conduction and convection.
PHOTOVOLTAIC CELL:	A device to convert any light into electric current. Monocrystals, polycrystals and amorphous silicon wafers have been used for some cost effective applications on earth.
PROTECTED SURFACE:	See p. 21.
RADIATION:	The transfer of heat from a warm, luminous or shining body to a cooler solid or fluid substance, by the transmission of waves of photons - light energy units - travelling through vacuum, through the exchange of electromagnetic energy.

SHADE CONTROL:	See p. 21.
SKYWINDOW:	The opening to the sky which should theoretically be available to any solar collector on earth. It is formed by tracing the highest and lowest sunpaths in the year for the collector's latitude (i.e., June 21st and December 21st respectively) and drawing the vertical lines representing sunlight reception between 9:00 a.m. and 3:00 p.m. at the collector's longitude (See Diag. 2).
SOL-AIR ORIENTATION:	A building orientation which ensures maximum comfort conditions for the human body by the absorption of maximum solar energy in the morning hours and the control of solar radiation in the afternoon hours. (For Ottawa, this orientation means that buildings should face 12° East of South, or an azimuth of 168° see Diag. 6).
SOLAR ACCESS:	Unobstructed reception of solar energy by a solar collector placed on a protected surface, for at least 85% of the collector's area, for 6 hours; or 100% of its area for 5 hours between 9:00 a.m. and 3:00 p.m. EST.
SOLAR ALTITUDE:	The vertical angle subtended by the sun at a point of solar energy reception on earth, measured between the horizontal direction and the height of the sun at a particular moment - see Diagram 3.
SOLAR AZIMUTH:	The horizontal angle subtended by the sun at a point of solar energy reception on earth, measured clockwise between North and the direction of the sun at a particular moment of the earth's rotation - see Diagram 3.
SOLAR COLLECTOR:	See p. 11 and Diagram 5.
SOLAR DESIGN:	The imaginative use of materials to control the reception of solar energy - in terms of light, heat and radiation - by managing the processes of conduction, convection and radiation.
SOLAR ENERGY:	The energy produced by thermonuclear fusion of hydrogen into helium on the sun and transmitted by electromagnetic waves of infrared and ultraviolet radiation into space.
SOLAR ENVELOPE:	See pp. 17 and 18.

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EPILOGUE

The success of these GUIDELINES will be judged by the inspiration they provide to designers for innovative solar architecture and by the solar access protection they ensure to property owners and tenants in the City. Comments on the performance of these GUIDELINES by building designers and residents will therefore be most welcome, to help improve and extend their application onto novel technological developments and solar design features.

Please send your comments to:

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POOR

QUALITY

ORIGINAL